https://ntrs.nasa.gov/search.jsp?R=19740010375 2020-03-23T10:45:39+00:00Z

NASA TECHNICAL MEMORANDUM

NASA TM X-64751
Revision 2

THE OCTOBER 1973 SPACE SHUTTLE TRAFFIC MODEL

By Shuttle Utilization Planning Office
Program Development

January 1974

(NASA-TM-X-64751) THE OCTOBER 1973 SPACE SHUTTLE TRAFFIC MODEL, REVISION 2 (NASA) 208 p HC $13.50 CSCL 22A
N74-18488
Unclas
G3/30 31265

NASA

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
TM X-64751, Revision 2		

4. TITLE AND SUBTITLE	5. REPORT DATE
The October 1973 Space Shuttle Traffic Model	January 1974
	6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
Shuttle Utilization Planning Office	
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. WORK UNIT NO.
George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812	11. CONTRACT OR GRANT NO.
	13. TYPE OF REPORT & PERIOD COVERED
12. SPONSORING AGENCY NAME AND ADDRESS	
National Aeronautics and Space Administration Washington, D.C. 20546	Technical Memorandum
	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

Prepared by Shuttle Utilization Planning Office, Program Development

16. ABSTRACT

Traffic model data for the Space Shuttle for calendar years 1980 through 1991 are presented along with some supporting and summary data. This model was developed from the 1973 NASA Payload Model, dated October 1973, and the NASA estimate of the 1973 Non-NASA/Non-DoD Payload Model. The estimates for the DoD flights included in this document are based on the 1971 DoD Mission Model.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
Shuttle Traffic Model Payload Mission	Unclassified-unlimited LEON B. ALLEN, PD-PL

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	207	NTIS

For sale by National Technical Information Service, Springfield, Virginia 22151

ACKNOWLEDGMENT

The data contained in this document were developed jointly by the Mission and Payload Integration Office of NASA Headquarters, Washington, D. C., and the Program Development Directorate of Marshall Space Flight Center, Huntsville, Alabama, under the overall direction of Mr. William O. Armstrong, NASA Headquarters, Washington, D. C. and Mr. William A. Huff, Marshall Space Flight Center, Alabama. Mr. Mac Croft of Marshall Space Flight Center was responsible for directing the capture analysis activities leading to this document.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Concluded)

TECHNICAL MEMORANDUM X-64751, Revision 2

THE OCTOBER 1973 SPACE SHUTTLE TRAFFIC MODEL

SUMMARY

Traffic model data for the Space Shuttle for calendar years 1980 through 1991 are presented along with some supporting and summary data. This model was developed from the 1973 NASA Payload Model, dated October 1973, and the NASA estimate of the 1973 Non-NASA/Non-DoD Payload Model. The estimates for the DoD flight included in this document are based on the 1971 DoD Mission Model.

This document is intended for NASA planning purposes only. The payload data in this document do not represent approved program information. The data were generated to help guide the development of an economical Space Transportation System (Space Shuttle and Tug) and the sortie payload carrier, the Spacelab. Low cost payloads which take advantage of the Space Shuttle's payload-oriented capabilities are assumed where cost effective. The low cost payload design effects and Shuttle assignments for DoD missions were provided by NASA and have not been approved by the Department of Defense.

INTRODUCTION

The evolution of a meaningful traffic model for the Space Shuttle necessarily includes the development of payloads which take advantage, both economically and scientifically, of the unique capabilities provided by the Space Shuttle. The data included in this document are derived from a "best mix" (based on lowest costs) of current design expendable, current reusable, and low cost payloads. Current design reusable payloads are current design payloads with additional hardware, where appropriate, for recovery and reuse. Low cost payload assumptions include not only payload reusability but many additional cost-saving concepts such as relaxation of weight and volume constraints, optimization of reliability and lifetime, standardization of subsystems and components, and design for maintainability.

The payload weight and dimensional data, as obtained from the various Program Office sources (as shown in the 1973 NASA Payload Model), generally

represent current design practice for expendable payloads. The weights reflected in this document take advantage of the low cost effects and, therefore, will not agree with the weights presented in the 1973 NASA Payload Model.

The payload launch schedules are presented in Tables 1 and 2. Table 3 lists each of the automated payloads flown in the manifests of Table 4. The dimensions, type of design, MMD, and the launch/retrieval schedule are shown for each payload. The flight manifests are shown for each year in Table 4. The Shuttle flight numbers listed in Table 4 do not represent a priority of flights or a sequence of flights for any given year. Table 5 is the manifest for those payloads launched on expendable launch vehicles during the buildup years of the Shuttle. Tables 6, 7, and 8 are the traffic summaries for the Shuttle, Tug, expendable launch vehicles, and the Spacelab. Table 9 is a further breakout of the sortie missions flown during the Shuttle era. All missions are 7 days, except those noted as 30 days in the Code column.

For this analysis, it was assumed that no payloads from the payload model would be flown on Shuttle flights during 1979. However, this does not represent a final NASA decision and it is possible that some payloads may be flown which do not interfere with the early Shuttle validation flights.

GROUND RULES

Payload Model

- The payload model for NASA Shuttle missions in the 1980-1991 period assumed an average NASA level budget of $ 3.3B (1972 constant dollars).

- Analysis based on NASA/Non-NASA/Non-DoD payloads defined in the 1973 NASA Payload Model dated October 1973.

- DoD Payload Model is August 1971 (updated), Option B.

Automated Payloads

- Program content for NASA payloads provided by NASA discipline offices.

- Foreign program content provided by NASA discipline offices and reviewed by the European Space Research Organization (ESRO).

- Non-NASA/Non-DoD program content synthesized from discipline office interpretation of current user planning.

- Payload designs and costing utilize data base resulting from LMSC, TRW, and Aerospace analysis.

- Redesign of payloads for shuttle utilization will neither degrade nor upgrade mission objectives.

Spacelab Payloads

- NASA Spacelab payloads derived from NASA/scientific community working groups and coordinated by the Joint User Requirements Group (JURG).

- Foreign Spacelab missions provided by ESRO.

- Thirty-day Spacelabs begin no earlier than CY-1983.

- Three Spacelab/Shuttle configurations considered for capture (lab only, lab/pallet, and pallet only).

Space Shuttle

- Configuration and capability consistent with latest Shuttle design concept (2 percent c.g. and 32 000 pound landing weight limit).

- Shuttle buildup rate: 14 flights in 1980, 36 flights in 1981, 50 flights in 1982.

- IOC of Shuttle assumed late CY-1979.

- Turnaround time on ground assumed to be 2 weeks per Shuttle.

- Shuttle reliability consistent with Aerospace Corporation ground rules used in 1971 Mission Model Analysis.

Space Tug

- Retrievable (interim) Tug IOC late CY-1980; full performance Tug with payload retrieval IOC late CY-1983.

- Turnaround time on ground assumed to be same as Shuttle (2 weeks).

- Tug reliability consistent with Aerospace Corporation ground rules used in 1971 Mission Model Analysis.

Spacelab

- Spacelab developed by Europeans.
- Availability assumed at Shuttle IOC.
- Configuration and performance consistent with latest Spacelab design.
- Docking module required for Spacelab missions (except pallet only missions).
- Turnaround time on ground dependent on experiment complement and flight configuration.

Expendable Launch Vehicles

- For automated missions: Scout, TAT, Atlas/Centaur, Titan derivatives.
- Direct operating costs reflect rate effects.

Launch Sites

- ETR available as required for entire time span.
- WTR available in late CY-1982.
- No polar launches from ETR.

Cost/Capture Analysis

- Low cost effects incorporated where applicable into payload designs for use for both the expendable launch vehicles and Shuttle cases.
- Capture analysis restrained by Shuttle and Tug delivery/retrieval capability, cargo volume, c.g. limit, landing weight limit, ground turnaround time, Shuttle overhaul, etc.
- 1980 through 1991 time span assumed for analysis.
- Post-1991 (1992-1998) payload model synthesized to avoid program "tailoff."

- Payload multiples permitted in both Shuttle and expendable cases.
- DoD payloads not be combined with non-DoD payloads.
- Costs include reliability effects of vehicles, carriers, and payloads.
- All costs in 1972 constant dollars.
- Shuttle, Tug, and Spacelab developments, and unit and operations costs provided by program offices.

GLOSSARY

A-C	Designation for first three missions
Adv.	Advanced
Alt.	Altitude
Appl.	Application
Apo	Apogee, high point of orbital altitude in nautical miles
Astr.	Astronomy
Atm.	Atmosphere
ATS	Applications Technology Satellite
AU	Astronomical Unit (mean distance from sun to earth)
Auto	Automated
Bio.	Biological
CDE, CE	Current Design Expendable
CDR, CR	Current Design Reusable
C/N	Communications and Navigation
Code	Refers to payload designation
Comm.	Communications
Coop	Cooperative
CPM	Cargo Propulsion Module
CRL	Crew rotation and logistics payloads
D-E	Designation for fourth and fifth missions
Deg	Degree
Dem, Demo	Demonstration
Diam	Diameter, refers to payload
DN	Down
DoD	Department of Defense
Dur.	Duration
ECS	Environmental Control System
Encke	Comet

Energy Stage	Large propulsion stage which fits inside Shuttle Orbiter Payload Bay
Env., Environ	Environment
EO	Earth observations
EOP, EOPAP	Earth and Ocean Physics Applications Program
EOS	Earth Observation Satellite
EOSO	Earth Orbiting Solar Observatory
Eq	Equatorial
ERTS	Earth Resources Technology Satellite
ESRO	European Space Research Organization
ETR	Eastern Test Range
Exp.	Expendable
Exper.	Experiment
Expos	Exposure
FLT	Flight
Flyby	Spacecraft studies target while passing through near vicinity
Foc. X-Ray	Focusing X-Ray Telescope
Follow-on	Refers to subsequent flights for more detailed investigations
G	Gemini
GEOS	Geodetic Satellite
Geosyn	Geosynchronous orbit
GPL	General Purpose Spacelab
Grav.	Gravitational
GRAVSAT	Gravitational Satellite
Halo	Lunar orbiting communication satellite
HEAO	High Energy Astronomy Observatory

Helioc., Helio.	Heliocentric
Helios	Solar mission
Hi	High
Inc	Inclination, angular distance from the Equator in degrees
Inject.	Injection
Interpl.	Interplanetary
Interstel.	Interstellar
IR	Infrared
I Tug	Interim Tug
Jup	Jupiter
KSC	Kennedy Space Center
L	Spacelab (Lab only)
Lab.	Laboratory
LCE	Low Cost Expendable
LCR	Low Cost Reusable
LAGEOS	Laser Geodynamic Satellite
L/D	Length/Diameter in feet
LEO	Low Earth Orbit
LNCH	Launch
L+P	Spacelab (Lab plus pallet)
LRO	Large Radio Observatory
LS	Life Sciences
LSO	Large Solar Observatory
LST	Large Space Telescope
Magnet.	Magnetic
Manifest	Results of payload capture analysis (based on lowest total program costs)
Max.	Maximum, refers to maximum solar activity

MHD	Magnetohydrodynamics
lb	Pounds
Med.	Medium
Met., Meteor.	Meteorology
Mini	Small
MMD	Mean mission duration
Mod.	Module
Monit	Monitoring
N	New
NMI, n. mi.	Nautical miles
Nav.	Navigation
Nept., Nep.	Neptune
Nimbus	Meteorology satellite
NN/D	Non-NASA/Non-Dod
N-P	Refers to mission number
Obs	Observation
Observ.	Observatory
OMS	Orbital Maneuvering System
Oper.	Operational
Orbit	Altitude in nautical miles/inclination in degrees (both apogee and perigee shown for elliptical orbit)
Orb	Orbiter
P	Pallet, refers to Spacelab Pallet-only configuration
Per	Perigee, low point of orbital altitude in nautical miles
Perf	Performance
Pert., Perturb	Perturbation
PHY	Physics
P/L	Payload
PL, Pl	Planetary

Proc.	Processing
Proto.	Prototype
R	Refurbished
RCS	Reaction Control System
R&D	Research and Development
Rel.	Relativity
Rend	Rendezvous
Ret.	Return
Revisits	Rendezvous with orbiting spacecraft for maintenance and data retrieval
Sat.	Satellite
Sat/Uran.	Saturn/Uranus
S/C	Spacecraft
SCI	Sciences
SEASAT	Seastate Satellite for ocean physics
SEOS	Synchronous Earth Observation Satellite
Sortie	Refers to payload carrier, Spacelab, Spacelab plus Pallet, or Pallet only
SP	Space Processing
Sp	Space
S.S.	Space Station
ST	Space Technology
Stel	Stellar
Surf.	Surface
Syn.	Geosynchronous orbit
Syn. Eq.	Geosynchronous equatorial orbit (19,000 n. mi, 0 deg inclination)
Sys	System
TAT	Thrust Augment Thor
Tech	Technology

Telesc.	Telescope
Tiros	Meteorology satellite
Trip	From Earth surface to Earth orbit (up)
Type	Refers to payload technology level
U-Probe	Uranus probe
U.S.	United States
UV	Ultraviolet
Varies	Refers to multiple payload destinations and/or descriptions
Viking	Mars soft lander
WTR	Western Test Range
XI Tug	Expendable interim Tug
XUV	Extreme ultraviolet

Payload Code Definition

AST	Astronomy Program
PHY	Physics Program
PL	Planetary Exploration Program
LUN	Lunar Exploration Program
LS	Life Sciences Program
EO	Earth Observations Program
EOP	Earth and Ocean Physics Applications Program
C/N	Communications and Navigation Program
SP	Space Processing Program
ST	Space Technology Program
NN/D	Non-NASA/Non-DoD Payloads

PRECEDING PAGE BLANK NOT FILMED

TABLE 1-A. PAYLOAD SUMMARY SCHEDULE (TOTAL)

	80	81	82	83	84	85	86	87	88	89	90	91	TOTAL
NASA AUTOMATED	17	22	13	15	17	20	23	21	15	18	21	19	221
NASA SORTIE	11	17	21	22	25	27	28	26	28	27	27	27	286
NASA TOTAL	28	39	34	37	42	47	51	47	43	45	48	46	507
NON-NASA AUTOMATED	8	10	9	10	8	9	12	6	19	9	17	8	125
NON-NASA SORTIE	2	3	3	4	3	5	5	5	5	5	5	5	50
NON-NASA TOTAL	10	13	12	14	11	14	17	11	24	14	22	13	175
DOD	34	18	21	32	28	25	23	25	25	25	26	22	304
SUM TOTAL	72	70	67	83	81	86	91	83	92	84	96	81	986

PRECEDING PAGE BLANK NOT FILMED

PRECEDING PAGE BLANK NOT FILMED

TABLE 1-B. PAYLOAD SUMMARY SCHEDULE (AUTOMATED)

NASA	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	TOTAL
ASTRONOMY	5	2	4	5	4	7	6	7	5	6	5	6	62
PHYSICS	2	3	1	2	3	1	2	3	4	3	4	4	32
PLANETARY	2	7	0	3	4	5	5	2	0	2	2	2	34
LUNAR	0	0	0	0	1	0	1	1	1	1	1	1	7
EARTH OBSERVATIONS	3	4	3	3	2	4	2	6	2	4	2	4	39
EARTH AND OCEAN PHYSICS	2	4	2	0	0	1	4	0	0	0	4	0	17
COMMUNICATIONS / NAVIGATION	0	0	0	0	0	0	0	0	0	0	0	0	0
LIFE SCIENCES	2	2	2	2	2	2	2	2	2	2	2	2	24
SPACE PROCESSING	0	0	0	0	0	0	0	0	0	0	0	0	0
SPACE TECHNOLOGY	1	0	1	0	1	0	1	0	1	0	1	0	6
TOTAL NASA	17	22	13	15	17	20	23	21	15	18	21	19	221
NON-NASA – NON-DOD													
COMMUNICATIONS / NAVIGATION	6	6	5	8	6	6	6	3	9	5	9	4	73
EARTH OBSERVATIONS	2	4	4	2	2	3	3	3	7	4	5	4	43
EARTH AND OCEAN PHYSICS	0	0	0	0	0	0	3	0	3	0	3	0	9
TOTAL NON NASA	8	10	9	10	8	9	12	6	19	9	17	8	125
TOTAL DOD	34	18	21	32	28	25	23	25	25	25	26	22	304
TOTAL AUTOMATED S / C	59	50	43	57	53	54	58	52	59	52	64	49	650

TABLE 1-C. PAYLOAD SUMMARY SCHEDULE (SORTIE)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Total
NASA													
Astronomy	1	2	3	4	5	7	7	6	6	6	5	6	58
Physics	1	2	3	3	5	5	6	5	6	5	6	5	52
Earth Observations	2	2	2	2	2	2	2	2	2	2	2	2	24
Space Processing	1	2	4	4	4	4	4	4	4	4	4	4	43
Earth and Ocean Physics	2	2	2	2	2	2	2	2	2	2	2	2	24
Communication & Navigation	0	1	1	1	1	1	1	1	1	1	1	1	11
Life Science	2	2	2	2	2	2	2	2	3	3	3	3	28
Space Technology	2	4	4	4	4	4	4	4	4	4	4	4	46
Total	11	17	21	22	25	27	28	26	28	27	27	27	286
Non/NASA-Non/DoD													
Space Manufacturing	0	0	0	0	0	1	2	1	2	1	2	1	10
Foreign Sortie	2	3	3	4	3	4	3	4	3	4	3	4	40
Total	2	3	3	4	3	5	5	5	5	5	5	5	50
Grand Total	13	20	24	26	28	32	33	31	33	32	32	32	336

TABLE 2-A. PAYLOAD SCHEDULE (ASTRONOMY PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																					
AST-1	Explorers		②	①	②	①	①	②	1	2	1	1	2	1	2	1	2	1	1	1	1	26
AST-2	Orbiting Solar Obs.			①																		1
AST-3	Solar Physics Mission																					7
AST-4	High Energy Astr. Obs. A-C						①	①	①	C′												4
	Large Observatories											D_1				E_1	D_2				E_2	
AST-5	High Energy Astr. Obs. D+E																					4
	Revisits												1		1		1		2			5
AST-6	Large Space Telescope																					3
	Revisits										1	1		1	1	1	1		1	1	1	9
AST-7	Large Solar Obs.																					1
	Revisits															1	1	1	1	1	1	6
AST-8	Large Radio Obs.																					1
	Revisits												A			B	1		1		1	3
AST-9	Focusing X-Ray Telesc.																				A	3
	Revisits													1	1			1		1		4
	Total Autom.		2	2	2	1	2	4	2	5	2	4	5	4	7	6	7	5	6	5	6	77
	Sortie Payloads																					
AST-10	Stellar										1	2	2	3	4	5	3	4	3	3	3	33
AST-11	Solar									1	1	1	2	2	3	2	3	2	3	2	3	25

Notes:

◯ **Approved and Ongoing**

TABLE 2-B. PAYLOAD SCHEDULE (PHYSICS PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																					
PHY-1	Explorers		②	①	②	①	②	①	2	1	2	1	1	2	1	1	1	2	2	2	2	29
PHY-2	Grav. & Rel. Sat.									1			1			1					1	4
PHY-3	Environ. Perturb. Sat.										1			1			1			1		4
PHY-4	Helio. & Interstel. S/C																	1				1
	Large Observatories																					
PHY-5	Cosmic-Ray Laboratory																1					1
	Revisits																	1	1	1	1	4
	Total Autom.		2	1	2	1	2	1	2	2	3	1	2	3	1	2	3	4	3	4	4	43
	Sortie Payloads																					
PHY-6	High Energy Astrophysics									1	1	2	2	2	2	2	2	2	2	2	2	22
PHY-7	Atmospheric and Space Physics										1	1	1	3	3	4	3	4	3	4	3	30

Note:
◯ Approved and Ongoing

TABLE 6. PLANETARY EXPLORATION PROGRAM (PL)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Approved Programs																					
PL-1	Mariner Venus/Mercury		①△																			1
PL-2	Pioneer Jupiter Flyby			①		①																0
PL-3	Helios				②																	2
PL-4	Viking 75						②															2
PL-5	Mariner Jup/Sat 77																					2
	Inner Planets																					
PL-6	Viking Orbiter/Lander 79								1													1
PL-7	Surface Sample Return													2								2
PL-8	Satellite Sample Return																			1	1	2
PL-9	Pioneer Venus							2														2
PL-10	Inner Pl. Follow-On									1	2		1			1						5
PL-11	Venus Radar Mapper												2									2
PL-12	Venus Buoyant Station														2							2
PL-13	Mercury Orbiter																2					2
PL-14	Venus Large Lander																		2			2
	Outer Planets																					
PL-15	Mariner Jup/Uranus Flyby								2													2
PL-16	Pioneer Jup/Uranus Flyby (Uranus Probe)								1													1
PL-17	Pioneer Saturn Probe									1												1
PL-18	Pioneer Sat/Uranus Flyby (U Probe)										1											1
PL-19	Mariner Jupiter Orbiter										2											2
PL-20	Pioneer Jupiter Probe													2								2
PL-21	Mariner Saturn Orbiter														2							2
PL-22	Mariner Uranus/Nep Flyby															2						2
PL-23	Jupiter Sat. Orb/Lander																			1	1	2
	Comets & Asteroids																					
PL-24	Dual Comet Flyby					1																1
PL-25	Encke Slow Flyby								1													1
PL-26	Encke Rendezvous										2											2
PL-27	Halley Flyby														1							1
PL-28	Asteroid Rendezvous															2						2
	Total		1	1	2	2	2	2	5	2	7	0	3	4	5	5	2	0	2	2	2	49

Note: ◯ Approved and Ongoing
△ Launched

TABLE 2-D. PAYLOAD SCHEDULE (LUNAR EXPLORATION PROGRAM)

Payload Code	Payload	CY 73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																				
LUN-1	Lunar Polar Orbiter							1													1
LUN-2	Lunar Orbiter												1		1						2
LUN-3	Lunar Rover															1	1				2
LUN-4	Lunar Halo																	1			1
LUN-5	Lunar Sample Return																		1	1	2
	Total							1					1		1	1	1	1	1	1	8

TABLE 2-E. PAYLOAD SCHEDULE (LIFE SCIENCES PROGRAM)

Payload Code	Payload	CY 73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																				
LS-1	Life Sciences Research Module					1		1	2	2	2	2	2	2	2	2	2	2	2	2	26
	Total Autom.					1		1	2	2	2	2	2	2	2	2	2	2	2	2	26
	Sortie Payloads																				
LS-2	Laboratory and Carry-On Payloads								2	2	2	2	2	2	2	2	3	3	3	3	28

TABLE 2-F. PAYLOAD SCHEDULE (EARTH OBSERVATION PROGRAM)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																					
EO-1	Earth Resources Tech. Sat.					(1)																1
EO-2	NIMBUS			(1)			(1)															2
EO-3	**Earth Observatory Sat.**							1	1	1	1	1	1	1	2	1	1	1	1	1	1	15
EO-4	Syn. Earth Obs. Sat.										1		1		1		2		2		2	9
EO-5	Special Purpose Sat.					1	1	1	2	2	2	1	1	1	1	1	1	1	1	1	1	19
EO-6	TIROS						(1)					1					1					3
EO-7	Syn. Meteorological Sat.		(1)	(1)				1									1					4
	Total Autom.		1	2		2	3	3	3	3	4	3	3	2	4	2	6	2	4	2	4	53
	Sortie Payloads																					
EO-8	(Weather Simulation Lab., Sensor R&D)									2	2	2	2	2	2	2	2	2	2	2	2	24

Note:
◯ Approved and Ongoing

TABLE 2-G. PAYLOAD SCHEDULE (EARTH AND OCEAN PHYSICS APPLICATION PROGRAM)

Payload Code	Payload	CY 73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																				
EOP-1	Geodetic Earth Orbiting Sat.		①																		1
EOP-2	Laser Geodynamic Sat.				①																1
EOP-3	SEASAT					1					1										2
EOP-4	GEOPAUSE							1			1										2
EOP-5	Grav. Gradiometer								1												1
EOP-6	Mini-Laser Geodynamic Sat.								1					1							2
EOP-7	GRAVSAT							1													1
EOP-8	Vector Magnetometer Sat.									3					3				3		9
EOP-9	Magnetic Monitor Sat.									1					1				1		3
	Total Autom.		1		1	1		2	2	4	2			1	4				4		22
	Sortie Payloads																				
EOP-10	(Earth and Ocean Dynamics Experiments)								2	2	2	2	2	2	2	2	2	2	2	2	24

Notes:

◯ Approved and Ongoing

TABLE 2-H. PAYLOAD SCHEDULE (COMMUNICATIONS AND NAVIGATION PROGRAM)

Payload Code	Payload	CY 73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																				
C/N-1	Applic. Tech. Sat.		(1)																		1
C/N-2	Coop. Applic. Sat.			(1)																	1
	Total		1	1							0		0	0	0	0	0				2
	Sortie Payloads																				
CN/3	(Antenna Configurations Laser Technology, Traffic Management Techniques, Energy Transfer Experiment)									1	1	1	1	1	1	1	1	1	1	1	11

Note:

◯ Approved and Ongoing

TABLE 2-I. PAYLOAD SCHEDULE (SPACE PROCESSING PROGRAM)

Payload Code	Payload	CY 73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Sortie Payloads																				
SP-1	(Crystal Growth, Biological Separation, Metallurgy)								1	2	4	4	4	4	4	4	4	4	4	4	43

TABLE 2-J PAYLOAD SCHEDULE (SPACE TECHNOLOGY PROGRAM)

Payload Code	Payload	CY 73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Automated Spacecraft																				
ST-1	Long Duration Exposure Mod.								⌐		⌐		⌐		⌐		⌐		⌐		6
	Total Autom.								1		1		1		1		1		1		6
	Sortie Payloads																				
ST-2	(Advanced Technology Lab, Fluid Physics, Gas Chemistry, Contamination Monitoring)								2	4	4	4	4	4	4	4	4	4	4	4	46

TABLE 2-K. PAYLOAD SUMMARY (NON-NASA/NON-DoD PAYLOADS)

Payload Code	Payload	CY	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	Total
	Comm/Nav																					
NN/D-1	International Comm.		3	1	2	1	1	1	2	3			2	3	2	2			2	3	2	30
NN/D-2	U.S. Domestic			7	3	1	1	4	1	1	2	2	4	1	1	2	2	6	2	2	1	43
NN/D-3	Disaster Warning										1	1			1					1		4
NN/D-4	Traffic Management					2	1	3	1	2	2	1	1	1		1		1		1		17
NN/D-5	Foreign Comm.		2	1	3	2	3	1			1	1	1	1	1	1	1	1	1	1	1	23
NN/D-6	Communication R&D/Prototype														1			1		1		3
	Earth Observations																					
NN/D-7	Tiros Operational Sat.		1	1	1	1	1	1	1													7
NN/D-8	Environ. Monitoring Sat.									1	1	1			1	1	1	1		1	1	9
NN/D-9	Foreign Syn. Met. Sat. (2 Systems)							1			1	1		1		1		1		1		7
NN/D-10	Geosyn. Oper. Environmental Sat.				1	1	1	1	1		1	1	1		1		1	1	1		1	13
	Earth Resources Sat.																					
NN/D-11	Low Earth Orbit (2 Systems)						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
NN/D-12	Geosynchronous																	2		2		4
NN/D-13	Foreign Syn. Earth Obs. Sat.																	1	2		1	4
	Earth and Ocean Physics																					
NN/D-14	Global Earth & Ocean Monit. Sys.															3		3		3		9
	Total Autom.		6	10	10	8	9	13	7	8	10	9	10	8	9	12	6	19	9	17	8	188
	Sortie Payloads																					
NN/D-15	Space Manufacturing														1	2	1	2	1	2	1	10
NN/D-16	Foreign Sortie									2	3	3	4	3	4	3	4	3	4	3	4	40

TABLE 3-A. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE
(ASTRONOMY PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
AST-1A CDR 650 12.2 2.6	ETR 297/28.5 3 0 LOW EARTH ORBIT EXPLORER	LNCH SCH	1	1	1	1	1	1	1	1	1	1	1	1	12
		NEW	0	0	0	0	1	1	1	0	0	0	0	0	3
		REFURB	1	1	1	1	0	0	0	1	1	1	1	1	9
		RETRIEVED	1*	2*	1	0	0	0	0	1*	1*	1*	1*	1*	9
		ON-HAND	0	1	1	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	4	3	3	4	5	6	7	7	7	7	7	7	
AST-1B CDR 650 12.2 2.6	ETR 19323/28.5 3 0 SYN. ORBIT EXPLORER	LNCH SCH	1	0	0	1	0	1	0	1	0	0	0	0	4
		NEW	1*	0	0	1	0	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	1	0	1	0	0	0	0	2
		RETRIEVED	0	0	0	0	1	0	1	0	0	0	0	0	2
		ON-HAND	0	0	0	0	1	0	1	0	0	0	0	0	
		ON-ORBIT	1	1	1	2	1	2	1	2	2	2	2	2	1
AST-3 CDR 4282 13.1 11.6	ETR 270/30.0 2 0 SOLAR PHYSICS SATELLITE	LNCH SCH	1	0	1	0	1	0	1	0	1	0	1	0	6
		NEW	0	0	0	0	0	0	0	0	0	0	0	0	0
		REFURB	1	0	1	0	1	0	1	0	1	0	1	0	6
		RETRIEVED	1*	0	1*	0	1*	0	1*	0	1*	0	1*	0	6
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	1	1	1	1	1	
AST-4 CDR 6064 18.1 9.0	ETR 250/28.5 4 0 HEAO	LNCH SCH	1	0	0	0	0	0	0	0	0	0	0	0	1
		NEW	0	0	0	0	0	0	0	0	0	0	0	0	0
		REFURB	1	0	0	0	0	0	0	0	0	0	0	0	1
		RETRIEVED	1*	0	0	0	0	0	0	0	0	0	0	0	1
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	3	3	3	3	3	3	3	3	3	3	3	3	
AST-5 CDR 17434 17.5 14.0	ETR 200/28.5 4 0 HEAO	LNCH SCH	0	0	1	0	0	0	1	1	0	0	0	1	4
		NEW	0	0	1	0	0	0	1	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	1	0	0	0	1	2
		RETRIEVED	0	0	0	0	0	0	1	0	0	0	1	1	3
		ON-HAND	0	0	0	0	0	0	0	0	0	0	1	1	
		ON-ORBIT	0	0	1	1	1	1	1	2	2	2	1	1	
AST-5V CDR 3500 5.0 14.0	ETR 200/28.5 0 0 REVISIT	LNCH SCH	0	0	0	1	0	1	0	1	0	2	0	0	5
		NEW	0	0	0	1	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	1	0	1	0	2	0	0	4
		RETRIEVED	0	0	0	1	0	1	0	1	0	2	0	0	5
		ON-HAND	0	0	0	1	1	1	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE
*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-A. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (ASTRONOMY PROGRAM) (CONTINUED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
AST-6 CDR 20161 36.3 12.0	ETR 340/28.5 6 0 LST	LNCH SCH	1	0	0	1	0	0	0	0	1	0	0	0	3
		NEW	1	0	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	1	0	0	0	0	1	0	0	0	2
		RETRIEVED	0	0	0	1*	0	0	0	0	1*	0	0	0	2
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	1	1	1	1	1	
AST-6V CDR 3500 5.0 14.0	ETR 340/28.5 0 0 REVISIT	LNCH SCH	0	1	1	0	1	1	1	1	0	1	1	1	9
		NEW	0	1	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	1	0	1	1	1	1	0	1	1	1	8
		RETRIEVED	0	1	1	0	1	1	1	1	0	1	1	1	9
		ON-HAND	0	1	1	1	1	1	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	
AST-7 CDR 27034 58.5 15.0	ETR 190/28.5 7 0 LARGE SOLAR OBS.	LNCH SCH	0	0	0	0	0	1	0	0	0	0	0	0	1
		NEW	0	0	0	0	0	1	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	1	1	1	1	1	1	1	
AST-7V CDR 3500 5.0 14.0	ETR 190/28.5 0 0 REVISIT	LNCH SCH	0	0	0	0	0	0	1	1	1	1	1	1	6
		NEW	0	0	0	0	0	0	1	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	1	1	1	1	1	5
		RETRIEVED	0	0	0	0	0	0	1	1	1	1	1	1	6
		ON-HAND	0	0	0	0	0	0	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	
AST-8 CDR 2786 25.0 10.0	ETR 38646/28.5 7 0 LARGE RADIO OBS.	LNCH SCH	0	0	0	0	0	1	0	0	0	0	0	0	1
		NEW	0	0	0	0	0	1	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	1	1	1	1	1	1	1	
AST-8V CDR 3000 5.0 14.0	ETR 38646/28.5 0 0 REVISIT	LNCH SCH	0	0	0	0	0	0	0	1	0	1	0	1	3
		NEW	0	0	0	0	0	0	0	1	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	1	0	1	2
		RETRIEVED	0	0	0	0	0	0	0	1	0	1	0	1	3
		ON-HAND	0	0	0	0	0	0	0	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-A. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (ASTRONOMY PROGRAM) (CONCLUDED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
AST-9A CDR 17434 17.5 14.0	ETR 270/28.5 4 0 FOCUSING X-RAY TELESCOPE—A	LNCH SCH	0	0	0	1	0	0	0	0	0	0	0	1	2
		NEW	0	0	0	1	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	1	1
		RETRIEVED	0	0	0	0	0	0	0	1	0	0	0	0	1
		ON-HAND	0	0	0	0	0	0	0	1	1	1	1	0	
		ON-ORBIT	0	0	0	1	1	1	1	0	0	0	0	1	
AST-9AV CDR 3500 5.0 14.0	ETR 270/28.5 0 0 REVISIT	LNCH SCH	0	0	0	0	1	1	0	0	0	0	0	0	2
		NEW	0	0	0	0	1	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	1	0	0	0	0	0	0	1
		RETRIEVED	0	0	0	0	1	1	0	0	0	0	0	0	2
		ON-HAND	0	0	0	0	1	1	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	
AST-9B CDR 24136 52.5 14.0	ETR 270/28.5 5 0 FOCUSING X-RAY TELESCOPE—B	LNCH SCH	0	0	0	0	0	0	1	0	0	0	0	0	1
		NEW	0	0	0	0	0	0	1	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	1	1
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	1	
		ON-ORBIT	0	0	0	0	0	0	1	1	1	1	1	0	
AST-9BV CDR 3500 5.0 14.0	ETR 270/28.5 0 0 REVISIT	LNCH SCH	0	0	0	0	0	0	0	0	1	0	1	0	2
		NEW	0	0	0	0	0	0	0	0	1	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	1	0	1
		RETRIEVED	0	0	0	0	0	0	0	0	1	0	1	0	2
		ON-HAND	0	0	0	0	0	0	0	0	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-B. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE

(PHYSICS PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
PHY-1A CDR 1588 13.3 4.0	WTR 1900/90.0 1 0 EXPLORER-UPPER ATMOSPHERE	LNCH SCH	0	1	0	0	1	0	0	0	1	1	1	1	6
		NEW	0	1*	0	0	0	0	0	0	1	0	0	0	2
		REFURB	0	0	0	0	1	0	0	0	0	1	1	1	4
		RETRIEVED	0	0	0	0	1*	0	0	0	0	1*	1*	1*	4
		ON-HAND	0	0	0	0	0	0	0	0	0*	0	0	0	
		ON-ORBIT	4	5	5	5	5	5	5	5	6	6	6	6	
PHY-1B CDR 853 12.8 5.0	ETR 20000/28.5 1 0 EXPLORER-MED. ALTITUDE	LNCH SCH	0	1	0	0	1	0	0	0	1	1	1	1	6
		NEW	0	1	0	0	0	0	0	0	1	0	0	0	2
		REFURB	0	0	0	0	1	0	0	0	0	1	1	1	4
		RETRIEVED	0	0	0	0	1*	0	0	0	0	1*	1*	1*	4
		ON-HAND	0	0	0	0	0	0	0	0	0*	0	0	0	
		ON-ORBIT	1	2	2	2	2	2	2	2	3	3	3	3	
PHY-1C LCE 1226 10.4 6.1	ETR ESC/ .0 3 0 EXPLORER-HIGH ALTITUDE	LNCH SCH	1	0	1	1	0	1	1	1	0	0	0	0	6
		NEW	1*	0	1	1	0	1	1	1	0	0	0	0	6
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	2	3	3	4	5	6	6	6	6	6	
PHY-2A LCE 2614 13.6 12.5	WTR 100/90.0 1 0 GRAV. & REL. SAT.–A	LNCH SCH	1	0	0	1	0	0	0	0	0	0	0	0	2
		NEW	1*	0	0	1	0	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	2	2	2	2	2	2	2	2	2	
PHY-2B LCE 1373 12.0 9.3	ETR 1AU/28.5 2 0 GRAV. & REL. SAT.–B	LNCH SCH	0	0	0	0	0	0	1	0	0	0	0	1	2
		NEW	0	0	0	0	0	0	1	0	0	0	0	1	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	1	1	1	1	1	2	
PHY-3A CDR 3846 15.8 7.0	ETR 6900/55.0 3 0 ENVIRON. PERTURB. SAT.–A	LNCH SCH	0	1	0	0	1	0	0	0	0	0	0	0	2
		NEW	0	1	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	1	0	0	0	0	0	0	0	1
		RETRIEVED	0	0	0	0	1*	0	0	0	0	0	0	0	1
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	1	1	1	1	1	1	1	1	1	1	1	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-B. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (PHYSICS PROGRAM) (CONCLUDED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
PHY-3B CDR 9845 17.3 10.0	ETR 1900/55.0 3 0 ENVIRON. PERTURB. SAT.–B	LNCH SCH	0	0	0	0	0	0	0	1	0	0	1	0	2
		NEW	0	0	0	0	0	0	0	1	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	1	0	1
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	1*	0	1
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	1	1	1	1	1	
PHY-4 CDE 635 10.5 10.0	ETR ESC/28.5 7 0 HELIO & INTERSTEL. S/C	LNCH SCH	0	0	0	0	0	0	0	0	1	0	0	0	1
		NEW	0	0	0	0	0	0	0	0	1	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	0	1	1	1	1	
PHY-5 CDR 46758 43.5 14.0	ETR 200/28.5 5 0 COSMIC RAY LAB.	LNCH SCH	0	0	0	0	0	0	0	1	0	0	0	0	1
		NEW	0	0	0	0	0	0	0	1	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	1	1	1	1	1	
PHY-5V CDR 3500 5.0 14.0	ETR 200/28.5 0 0 REVISIT	LNCH SCH	0	0	0	0	0	0	0	0	1	1	1	1	4
		NEW	0	0	0	0	0	0	0	0	1	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	1	1	1	3
		RETRIEVED	0	0	0	0	0	0	0	0	1	1	1	1	4
		ON-HAND	0	0	0	0	0	0	0	0	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-C. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (PLANETARY EXPLORATION PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
PL-7 LCE 10640 23.5 14.7	ETR ESC/28.5 4 0 MARS SURFACE SAMPLE RETURN	LNCH SCH	0	0	0	0	2	0	0	0	0	0	0	0	2
		NEW	0	0	0	0	2	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	2	2	2	2	2	2	2	2	
PL-8 LCE 16419 51.6 14.7	ETR ESC/28.5 3 0 MARS SAT. SAMPLE RETURN	LNCH SCH	0	0	0	0	0	0	0	0	0	0	1	1	2
		NEW	0	0	0	0	0	0	0	0	0	0	1	1	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	1	2	
PL-10 LCE 2772 11.5 8.4	ETR ESC/28.5 1 0 INNER PL. FOLLOW-ON	LNCH SCH	1	2	0	1	0	0	1	0	0	0	0	0	5
		NEW	1*	2	0	1	0	0	1	0	0	0	0	0	5
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	3	3	4	4	4	5	5	5	5	5	5	
PL-11 LCE 13485 19.4 14.7	ETR ESC/28.5 1 0 VENUS RADAR MAPPER	LNCH SCH	0	0	0	2	0	0	0	0	0	0	0	0	2
		NEW	0	0	0	2	0	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	2	2	2	2	2	2	2	2	2	
PL-12 LCE 20617 17.3 14.7	ETR ESC/28.5 2 0 VENUS BUOYANT STA.	LNCH SCH	0	0	0	0	0	2	0	0	0	0	0	0	2
		NEW	0	0	0	0	0	2	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	2	2	2	2	2	2	2	
PL-13 LCE 8498 34.9 14.7	ETR ESC/28.5 2 0 MERCURY ORBITER	LNCH SCH	0	0	0	0	0	0	0	2	0	0	0	0	2
		NEW	0	0	0	0	0	0	0	2	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	2	2	2	2	2	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-C. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (PLANETARY EXPLORATION PROGRAM) (CONTINUED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
PL-14 LCE 6125 25.0 14.7	ETR ESC/28.5 2 0 VENUS LARGE LANDER	LNCH SCH	0	0	0	0	0	0	0	0	0	2	0	0	2
		NEW	0	0	0	0	0	0	0	0	0	2	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	2	2	2	
PL-17 CDE 1146 10.5 10.0	ETR ESC/28.5 7 0 PIONEER SATURN PROBE	LNCH SCH	1	0	0	0	0	0	0	0	0	0	0	0	1
		NEW	1*	0	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	1	1	1	1	1	
PL-18 CDE 1146 10.5 10.0	ETR ESC/28.5 7 0 SAT./URANUS FLYBY	LNCH SCH	0	1	0	0	0	0	0	0	0	0	0	0	1
		NEW	0	1	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	1	1	1	1	1	1	1	1	1	1	1	
PL-19 LCE 6888 25.0 14.7	ETR ESC/28.5 3 0 MARINER JUPITER ORBITER	LNCH SCH	0	2	0	0	0	0	0	0	0	0	0	0	2
		NEW	0	2	0	0	0	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	2	2	2	2	2	2	2	2	2	2	2	
PL-20 CDE 1169 10.5 10.0	ETR ESC/28.5 1 0 PIONEER JUPITER PROBE	LNCH SCH	0	0	0	0	2	0	0	0	0	0	0	0	2
		NEW	0	0	0	0	2	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	2	2	2	2	2	2	2	2	
PL-21 LCE 498 39.0 14.7	ETR ESC/28.5 5 0 MARINER SAT. ORBITER	LNCH SCH	0	0	0	0	0	2	0	0	0	0	0	0	2
		NEW	0	0	0	0	0	2	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	2	2	2	2	2	2	2	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-C. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (PLANETARY EXPLORATION PROGRAM) (CONCLUDED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
PL-22 CDE 2137 25.0 15.0	ETR ESC/28.5 12 0 MARINER URANUS/ NEP. FLYBY	LNCH SCH	0	0	0	0	0	0	2	0	0	0	0	0	2
		NEW	0	0	0	0	0	0	2	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	2	2	2	2	2	2	
PL-23 LCE 35795 42.3 14.7	ETR ESC/28.5 4 0 JUPITER SAT. ORB/LANDER	LNCH SCH	0	0	0	0	0	0	0	0	0	0	1	1	2
		NEW	0	0	0	0	0	0	0	0	0	0	1	1	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	1	2	
PL-26 LCE 497 19.9 14.7	ETR ESC/28.5 3 0 ENCKE RENDEZVOUS	LNCH SCH	0	2	0	0	0	0	0	0	0	0	0	0	2
		NEW	0	2*	0	0	0	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	2	2	2	2	2	2	2	2	2	2	2	
PL-27 LCE 2074 13.5 12.2	ETR ESC/28.5 5 0 HALLEY FLYBY	LNCH SCH	0	0	0	0	0	1	0	0	0	0	0	0	1
		NEW	0	0	0	0	0	1	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	1	1	1	1	1	1	1	
PL-28 LCE 4588 20.8 14.7	ETR ESC/28.5 3 0 ASTEROID RENDEZVOUS	LNCH SCH	0	0	0	0	0	0	2	0	0	0	0	0	2
		NEW	0	0	0	0	0	0	2	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	2	2	2	2	2	2	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-D. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE

(LUNAR EXPLORATION PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	**LNCH SITE** **ORBIT (ALT/INC)** **MMD (YRS)** **REFURB T (YRS)**		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
LUN-2 **LCE** **2475** **11.2** **7.8**	**ETR** **LUN/28.5** **0** **0** **LUNAR ORBITER**	LNCH SCH	0	0	0	0	1	0	1	0	0	0	0	0	2
		NEW	0	0	0	0	1	0	1	0	0	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON ORBIT	0	0	0	0	1	1	2	2	2	2	2	2	
LUN-3 **CDE** **8700** **24.0** **10.0**	**ETR** **LUN/28.5** **0** **0** **LUNAR ROVER**	LNCH SCH	0	0	0	0	0	0	0	1	1	0	0	0	2
		NEW	0	0	0	0	0	0	0	1	1	0	0	0	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	1	2	2	2	2	
LUN-4 **LCE** **4633** **19.1** **14.7**	**ETR** **LUN/28.5** **0** **0** **LUNAR HALO**	LNCH SCH	0	0	0	0	0	0	0	0	0	1	0	0	1
		NEW	0	0	0	0	0	0	0	0	0	1	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	1	1	1	
LUN-5 **CDE** **11500** **24.0** **10.0**	**ETR** **LUN/28.5** **0** **0** **LUNAR SAMPLE RETURN**	LNCH SCH	0	0	0	0	0	0	0	0	0	0	1	1	2
		NEW	0	0	0	0	0	0	0	0	0	0	1	1	2
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON ORBIT	0	0	0	0	0	0	0	0	0	0	1	2	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-E. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (LIFE SCIENCES PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
LS-1 LCR 683 6.8 2.2	ETR 300/28.5 0 0 LIFE SCIENCE RESEARCH MODULE	LNCH SCH	2	2	2	2	2	2	2	2	2	2	2	2	24
		NEW	2	0	0	0	0	0	0	0	0	0	0	0	2
		REFURB	0	2	2	2	2	2	2	2	2	2	2	2	22
		RETRIEVED	2	2	2	2	2	2	2	2	2	2	2	2	24
		ON-HAND	1	1	1	1	1	1	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW - MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-F. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE
(EARTH OBSERVATION PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
EO-3A LCR 8630 36.0 10.2	WTR 494/98.0 6 0 EARTH OBSERVATORY SAT.–A	LNCH SCH	0	0	0	1	0	0	0	1	0	0	0	0	2
		NEW	0	0	0	0	0	0	0	0	0	0	0	0	0
		REFURB	0	0	0	1	0	0	0	1	0	0	0	0	2
		RETRIEVED	0	0	1	0	0	0	1	0	0	0	0	1	3
		ON-HAND	0	0	1	0	0	0	1	0	0	0	0	1	
		ON-ORBIT	1	1	1	1	1	1	0	1	1	1	1	0	
EO-3AV LCR 3500 5.0 14.0	WTR 494/99.0 0 0 REVISIT	LNCH SCH	0	0	0	0	0	1	0	0	0	0	1	0	2
		NEW	0	0	0	0	0	1	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	1	0	1
		RETRIEVED	0	0	0	0	0	1	0	0	0	0	1	0	2
		ON-HAND	0	0	0	0	0	1	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	
EO-3B LCR 8630 36.0 10.2	WTR 494/99.0 4 0 EARTH OBSERVATORY SAT.–B	LNCH SCH	0	0	0	0	0	1	0	0	0	1	0	0	2
		NEW	0	0	0	0	0	0	0	0	0	0	0	0	0
		REFURB	0	0	0	0	0	1	0	0	0	1	0	0	2
		RETRIEVED	0	0	0	1	0	0	0	1	0	0	0	0	2
		ON-HAND	0	0	0	1	1	0	0	1	1	0	0	0	
		ON-ORBIT	1	1	1	0	0	1	1	0	0	1	1	1	
EO-3BV LCR 3500 5.0 14.0	WTR 494/99.0 0 0 REVISIT	LNCH SCH	0	0	1	0	0	0	0	0	0	0	0	0	1
		NEW	0	0	1	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	1	0	0	0	0	0	0	0	0	0	1
		ON-HAND	0	0	1	1	1	1	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	
EO-3C LCR 8630 36.0 10.2	WTR 494/99.0 4 0 EARTH OBSERVATORY SAT.–C	LNCH SCH	0	1	0	0	0	0	1	0	0	0	0	1	3
		NEW	0	1*	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	1	0	0	0	0	1	2
		RETRIEVED	0	0	0	0	0	1	0	0	0	1	0	0	2
		ON-HAND	0	0	0	0	0	1	0	0	0	1	1	0	
		ON-ORBIT	0	1	1	1	1	0	1	1	1	0	0	1	
EO-3CV LCR 3500 5.0 14.0	WTR 494/99.0 0 0 REVISIT	LNCH SCH	0	0	0	0	1	0	0	0	1	0	0	0	2
		NEW	0	0	0	0	1	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	1	0	0	0	1
		RETRIEVED	0	0	0	0	1	0	0	0	1	0	0	0	2
		ON-HAND	0	0	0	0	0	0	0	0	0	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-F. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (EARTH OBSERVATION PROGRAM) (CONTINUED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
EO-3D LCR 8630 36.0 10.2	ETR 400/28.5 0 0 EARTH OBSERVATORY SAT. TEST	LNCH SCH	1	0	0	0	0	0	0	0	0	0	0	0	1
		NEW	1	0	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	1	1	1	1	1	
EO-4A CDR 3085 11.0 7.4	ETR 19323/ .0 8 0 SYN. EARTH OBS. SAT.–R&D	LNCH SCH	0	1	0	1	0	1	0	0	0	0	0	0	3
		NEW	0	1	0	1	0	1	0	0	0	0	0	0	3
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	1	0	0	0	0	0	1
		ON-HAND	0	0	0	0	0	0	1	1	1	1	1	1	
		ON-ORBIT	0	1	1	2	2	3	2	2	2	2	2	2	
EO-4B CDR 3085 11.0 7.4	ETR 19323/ .0 5 0 SYN. EARTH OBS. SAT –OPER.	LNCH SCH	0	0	0	0	0	0	0	2	0	2	0	2	6
		NEW	0	0	0	0	0	0	0	2	0	2	0	2	6
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	2	2	4	4	6	
EO-5A LCE 676 9.7 4.7	ETR 19323/ .0 1 0 SPECIAL PURPOSE SAT–A	LNCH SCH	1	0	0	0	0	0	0	0	0	0	0	0	1
		NEW	1*	0	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	1	1	1	1	5	
EO-5B LCE 676 9.7 4.7	WTR 3000/90.0 1 0 SPECIAL PURPOSE SAT.–B	LNCH SCH	1	0	0	0	0	0	0	0	0	0	0	0	1
		NEW	1*	0	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	1	1	1	1	1	
EO-6C LCE 676 9.7 4.7	WTR 280/90.0 1 0 SPECIAL PURPOSE SAT.–C	LNCH SCH	0	2	0	0	1	0	0	1	0	0	1	0	5
		NEW	0	2*	0	0	1	0	0	1	0	0	1	0	5
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	2	2	2	3	3	3	4	4	4	5	5	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-F. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (EARTH OBSERVATION PROGRAM) (CONCLUDED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
EO-5D LCE 676 9.7 4.7	WTR 400/90.0 1 0 SPECIAL PURPOSE SAT.–D	LNCH SCH	0	0	1	0	0	1	0	0	1	0	0	1	4
		NEW	0	0	1*	0	0	1	0	0	1	0	0	1	4
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	1	1	1	2	2	2	3	3	3	4	
EO-5E LCE 676 9.7 4.7	ETR 19323/ .0 1 0 SPECIAL PURPOSE SAT.–E	LNCH SCH	0	0	0	1	0	0	1	0	0	1	0	0	3
		NEW	0	0	0	1	0	0	1	0	0	1	0	0	3
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	1	1	1	2	2	2	3	3	3	
EO-6 CDR 1717 15.3 8.0	WTR 790/102.0 2 0 TIROS	LNCH SCH	0	0	1	0	0	0	0	1	0	0	0	0	2
		NEW	0	0	1*	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	1	0	0	0	0	1
		RETRIEVED	0	0	0	0	1	0	0	0	0	0	0	0	1
		ON-HAND	0	0	0	0	1	1	1	0	0	0	0	0	
		ON-ORBIT	1	1	2	2	1	1	1	2	2	2	2	2	
EO-7 LCE 1077 10.9 7.2	ETR 19323/ .0 4 0 SYN. METEOR. SAT.	LNCH SCH	0	0	0	0	0	0	0	1	0	0	0	0	1
		NEW	0	0	0	0	0	0	0	1	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	2	2	2	2	2	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-G. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE
(EARTH AND OCEAN PHYSICS APPLICATION PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
EOP-3 LCE 3030 18.3 14.7	WTR 325/90.0 5 0 SEASAT	LNCH SCH	0	0	1	0	0	0	0	0	0	0	0	0	1
		NEW	0	0	1*	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	1	1	1	1	1	1	1	1	1	1	
EOP-4 CDE 2231 10.0 6.5	WTR 18200/90.0 3 0 GEOPAUSE	LNCH SCH	0	0	1	0	0	0	0	0	0	0	0	0	1
		NEW	0	0	1*	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	2	2	2	2	2	2	2	2	2	2	
EOP-5 LCE 10236 30.2 14.7	WTR 108/90.0 1 0 GRAV. GRADIOMETER	LNCH SCH	1	0	0	0	0	0	0	0	0	0	0	0	1
		NEW	1*	0	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	1	1	1	1	1	1	1	1	1	1	1	1	
EOP-6A CDE 225 1.6 1.6	ETR 350/28.5 0 0 MINI-LAGEOS	LNCH SCH	2	0	0	0	0	2	0	0	0	0	0	0	4
		NEW	2	0	0	0	0	2	0	0	0	0	0	0	4
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	2	2	2	2	2	4	4	4	4	4	4	4	
EOP-6B CDE 225 1.6 1.6	ETR 350/55.0 0 0 MINI-LAGEOS	LNCH SCH	2	0	0	0	0	2	0	0	0	0	0	0	4
		NEW	2*	0	0	0	0	2	0	0	0	0	0	0	4
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	2	2	2	2	2	4	4	4	4	4	4	4	
EOP-6C CDE 225 1.6 1.6	WTR 350/90.0 0 0 MINI-LAGEOS	LNCH SCH	2	0	0	0	0	2	0	0	0	0	0	0	4
		NEW	2*	0	0	0	0	2	0	0	0	0	0	0	4
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	2	2	2	2	2	4	4	4	4	4	4	4	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE
*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-G. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE

(EARTH AND OCEAN PHYSICS APPLICATION PROGRAM) (CONCLUDED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
EOP-8 LCR 1209 10.4 6.2	WTR 216/90.0 1 0 VECTOR MAGNETIC SAT.	LNCH SCH	0	3	0	0	0	0	3	0	0	0	3	0	9
		NEW	0	3*	0	0	0	0	0	0	0	0	0	0	3
		REFURB	0	0	0	0	0	0	3	0	0	0	3	0	6
		RETRIEVED	0	0	0	3	0	0	0	3	0	0	0	0	6
		ON-HAND	0	0	0	3	3	3	0	3	3	3	0	0	
		ON-ORBIT	0	3	3	0	0	0	3	0	0	0	3	3	
EOP-9 LCR 915 10.2 5.8	ETR 810/28.5 1 0 MAGNETIC MONITOR SAT.	LNCH SCH	0	1	0	0	0	0	1	0	0	0	1	0	3
		NEW	0	1	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	0	0	0	0	1	0	0	0	1	0	2
		RETRIEVED	0	0	0	0	1	0	0	1	0	0	0	0	2
		ON-HAND	0	0	0	0	1	1	0	1	1	1	0	0	
		ON-ORBIT	0	1	1	1	0	0	1	0	0	0	1	1	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW - MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-H. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE
(SPACE TECHNOLOGY PROGRAM)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
ST-1 CDR 10200 35.0 14.0	ETR 270/28.5 0 0 LONG DURATION EXPOSURE MODULE	LNCH SCH	1	0	1	0	1	0	1	0	1	0	1	0	6
		NEW	1*	0	0	0	0	0	0	0	0	0	0	0	1
		REFURB	0	0	1	0	1	0	1	0	1	0	1	0	5
		RETRIEVED	0	1	1	0	1	0	1	0	1	0	1	0	6
		ON-HAND	0	1	1	1	1	1	1	1	1	1	1	1	
		ON-ORBIT	0	0	0	0	0	0	0	0	0	0	0	0	

*NEW ROW - DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW - MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-1. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE
(NON-NASA/NON-DOD PAYLOADS)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
NN/D-1 CDR 4498 12.2 8.3	ETR 19323/ .0 10 0 INTEL SAT.	LNCH SCH	3	0	0	2	3	2	2	0	0	2	3	2	19
		NEW	3*	0	0	2	3	2	2	0	0	0	0	0	12
		REFURB	0	0	0	0	0	0	0	0	0	2	3	2	7
		RETRIEVED	0	0	0	0	0	0	0	1	1	2	3	0	7
		ON-HAND	0	0	0	0	0	0	0	1	2	2	2	0	
		ON-ORBIT	7	7	7	9	12	14	16	15	14	14	14	16	
NN/D-2A LCE 1057 11.1 7.6	ETR 19323/ .0 7 0 U.S. DOM. SAT.–A	LNCH SCH	1	2	2	1	0	0	0	0	0	0	0	0	6
		NEW	1*	2	2	1	0	0	0	0	0	0	0	0	6
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	4	6	8	9	9	9	9	9	9	9	9	9	
NN/D-2B CDR 4498 12.2 8.3	ETR 19323/ .0 10 0 U. S. DOM. SAT. –B	LNCH SCH	0	0	0	0	1	1	2	2	3	2	2	1	14
		NEW	0	0	0	0	1	1	2	2	3	2	2	1	14
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	1	2	4	6	9	11	13	14	
NN/D-2C CDR 974 17.9 6.3	ETR 19323/ .0 5 0 TDRS	LNCH SCH	0	0	0	3	0	0	0	0	3	0	0	0	6
		NEW	0	0	0	3	0	0	0	0	3	0	0	0	6
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	3	3	3	6	6	6	6	6	9	9	9	9	
NN/D-3 LCR 2054 11.4 8.2	ETR 19323/ .0 5 0 DISASTER WARNING	LNCH SCH	0	1	1	0	0	1	0	0	0	0	1	0	4
		NEW	0	1	1	0	0	1	0	0	0	0	0	0	3
		REFURB	0	0	0	0	0	0	0	0	0	0	1	0	1
		RETRIEVED	0	0	0	0	0	0	1	1	0	0	0	0	2
		ON-HAND	0	0	0	0	0	0	1	2	2	2	1	1	
		ON-ORBIT	0	1	2	2	2	3	2	1	1	1	2	2	
NN/D-4 LCE 1422 12.5 10.3	ETR 19323/ .0 5 0 TRAFFIC MANAGEMENT	LNCH SCH	2	2	1	1	1	0	1	0	1	0	1	0	10
		NEW	2*	2	1	1	1	0	1	0	1	0	1	0	10
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	7	9	10	11	12	12	13	13	14	14	15	15	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-1. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (NON-NASA/NON-DOD PAYLOADS) (CONTINUED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	-
NN/D-5 CDR 982 12.2 5.8	ETR 19323/ .0 7 0 FOREIGN COMM.	LNCH SCH	0	1	1	1	1	1	1	1	1	1	1	1	11
		NEW	0	1	1	1	0	0	0	0	0	0	0	0	3
		REFURB	0	0	0	0	1	1	1	1	1	1	1	1	8
		RETRIEVED	0	0	0	0	3*	1	0	0	1*	1*	1*	1*	8
		ON-HAND	0	0	0	0	2	2	1	0	0	0	0	0	
		ON-ORBIT	4	5	6	7	5	5	6	7	7	7	7	7	
NN/D-6 LCE 3871 13.1 11.6	ETR 19323/ .0 6 0 COMM. R&D PROTO	LNCH SCH	0	0	0	0	0	1	0	0	1	0	1	0	3
		NEW	0	0	0	0	0	1	0	0	1	0	1	0	3
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	1	1	1	2	2	3	3	
NN/D-8 LCR 2025 12.4 10.2	WTR 920/103.0 2 0 ENVIR. MONITORING	LNCH SCH	1	1	1	0	0	1	1	1	1	0	1	1	9
		NEW	1*	1*	1*	0	0	0	0	0	0	0	0	0	3
		REFURB	0	0	0	0	0	1	1	1	1	0	1	1	6
		RETRIEVED	0	0	0	0	3	0	0	1	1	1	1	0	7
		ON-HAND	0	0	0	0	3	2	1	1	1	2	2	1	
		ON-ORBIT	1	2	3	3	0	1	2	2	2	1	1	2	
NN/D-9 CDR 807 10.3 6.0	ETR 19323/ .0 4 0 FOREIGN SYN. MET. SAT.	LNCH SCH	0	1	1	0	1	0	1	0	1	0	1	0	6
		NEW	0	1	1	0	0	0	0	0	0	0	0	0	2
		REFURB	0	0	0	0	1	0	1	0	1	0	1	0	4
		RETRIEVED	0	0	0	0	1*	1	1	0	1	0	1	0	5
		ON-HAND	0	0	0	0	0	1	1	1	1	1	1	1	
		ON-ORBIT	1	2	3	3	3	2	2	2	2	2	2	2	
NN/D-10 CDR 807 10.3 6.0	ETR 19323/ .0 4 0 GEOSYN. OPER. ENVIRON. SAT.	LNCH SCH	0	1	1	1	0	1	0	1	1	1	0	1	8
		NEW	0	1	1	1	0	0	0	0	0	0	0	0	3
		REFURB	0	0	0	0	0	1	0	1	1	1	0	1	5
		RETRIEVED	0	0	0	0	3	1	1	1	0	1	0	1	8
		ON-HAND	0	0	0	0	3	3	4	4	3	3	3	3	
		ON-ORBIT	3	4	5	6	3	3	2	2	3	3	3	3	
NN/D-11 LCR 8630 16.0 10.2	WTR 300/97.0 5 0 LOW ORBIT EARTH RES.	LNCH SCH	1	1	1	1	1	1	1	1	1	1	1	1	12
		NEW	1*	1*	1*	0	0	0	0	0	0	0	0	0	3
		REFURB	0	0	0	1	1	1	1	1	1	1	1	1	9
		RETRIEVED	0	0	0	2*	1	1	1	1	1	1	1	1	10
		ON-HAND	0	0	0	1	1	1	1	1	1	1	1	1	
		ON-ORBIT	4	5	6	5	5	5	5	5	5	5	5	5	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW – MUST BE RETRIEVED BEFORE LAUNCH

TABLE 3-1. AUTOMATED PAYLOAD DESCRIPTION/SCHEDULE (NON-NASA/NON-DOD PAYLOADS) (CONCLUDED)

PLD CODE NO. PLD TYPE WEIGHT (LBS) LENGTH (FT) DIAMETER (FT)	LNCH SITE ORBIT (ALT/INC) MMD (YRS) REFURB T (YRS)		YEAR												
			80	81	82	83	84	85	86	87	88	89	90	91	T
NN/D-12 CDR 3085 11.0 7.4	ETR 19323/ .0 5 0 GEOSYN. EARTH RES.	LNCH SCH	0	0	0	0	0	0	0	0	2	0	2	0	4
		NEW	0	0	0	0	0	0	0	0	2	0	2	0	4
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	0	2	2	4	4	
NN/D-13 CDR 3085 11.0 7.4	ETR 19323/ .0 5 0 FOREIGN SYN. E. OBS.	LNCH SCH	0	0	0	0	0	0	0	0	1	2	0	1	4
		NEW	0	0	0	0	0	0	0	0	1	2	0	1	4
		REFURB	0	0	0	0	0	0	0	0	0	0	0	0	0
		RETRIEVED	0	0	0	0	0	0	0	0	0	0	0	0	0
		ON-HAND	0	0	0	0	0	0	0	0	0	0	0	0	
		ON-ORBIT	0	0	0	0	0	0	0	0	1	3	3	4	
NN/D-14 LCR 5082 13.7 12.7	WTR 200/98.0 3 0 GLOBAL EARTH & OCEAN MON.	LNCH SCH	0	0	0	0	0	0	3	0	3	0	3	0	9
		NEW	0	0	0	0	0	0	3	0	3	0	0	0	6
		REFURB	0	0	0	0	0	0	0	0	0	0	3	0	3
		RETRIEVED	0	0	0	0	0	0	0	0	0	3	0	3	6
		ON-HAND	0	0	0	0	0	0	0	0	0	3	0	3	
		ON-ORBIT	0	0	0	0	0	0	3	3	6	3	6	3	

*NEW ROW – DELIVERED ON AN EXPENDABLE LAUNCH VEHICLE

*RETRIEVAL ROW - MUST BE RETRIEVED BEFORE LAUNCH

EXPLANATION OF COLUMN HEADINGS FOR TABLE 4

Heading	Explanation
FLT NO	Flight number, a number used purely for reference and does not indicate the launch sequence. A "D" following the flight number indicates a DoD flight.
LNCH SITE	Launch site; KSC, Kennedy Space Center; WTR, Western Test Range.
TRIP	UP indicates payloads and/or Tug launched by Shuttle, DN indicates payloads and/or Tug retrieved.
CODE	Payload code.
NAME	Payload name.
	P - Pallet only L+P - Spacelab plus Pallet L - Spacelab only
TYPE	Payload type.
	CDR - Current Design Reusable CDE - Current Design Expendable LCR - Low Cost Reusable LCE - Low Cost Expendable N - New payload R - Refurbished payload
WEIGHT	Payload launch weight in lb.
L/D	Payload length and diameter in feet.
ORBIT HA/HP/INC	Payload orbit:
	HA - Apogee in n. mi. HP - Perigee in n. mi. INC - Inclination in degrees

Heading	Explanation
ENERGY STAGE	Tug (if any) used to deploy payloads: TUG - Final Tug (IOC, 1984) ITUG - Initial Tug (1981 - 1983) XITUG - Expendable initial Tug (1981 - 1991) B-II - Expendable solid propellant kickstage (1981 - 1991)
SHUTTLE CARGO WEIGHT	Total weight in cargo bay.
SHUTTLE CARGO LENGTH	Sum of length of all elements in cargo bay (i.e., payloads, Tug, OMS kit)
SHUTTLE PERF LOAD FACTOR	If the flight involves a Tug, this is the Shuttle cargo weight divided by the Shuttle performance into a 160 × 160 n. mi. orbit. Otherwise, this is the sum of Shuttle cargo weight and integral OMS propellant divided by the Shuttle performance into a 50 × 100 n. mi. transfer orbit.

SHUTTLE MANIFEST USER INFORMATION

Examination of the manifest (Table 4) shows that the sum of the payload weights/lengths is equal to the Shuttle cargo weights/lengths for some of the flights while this is not true for other flights. This difference is because of the requirement for Orbital Maneuvering Systems (OMS) kits or Tugs for some flights which is added to the payload weight to obtain the Shuttle cargo weight. The dimensional characteristics of the OMS kits or Tugs are also added to the payload lengths to obtain the cargo length. Examples are presented below which show the above-mentioned effects.

Example No. 1 — Flight No. 1 in 1980 shows a total payload-up weight of 21 293 pounds and a cargo weight of 35 691 pounds. This flight requires an OMS kit (tankage plus propellant) to satisfy the mission energy requirements, and the kit will be located in the Shuttle cargo bay. The inert

weight of the OMS kit is 2502 pounds and the propellant weight included in the kit for this mission is 11 896 pounds. Thus, the total cargo weight is the sum of the payload weight (21 293 pounds), OMS kit inert weight (2502 pounds), and the OMS kit propellant (11 896 pounds) for a total of 35 691 pounds. The cargo-down weight for this flight is the sum of the payload-down weight (4786 pounds) and the empty OMS kit weight (2502 pounds) for a total of 7288 pounds. The OMS kit utilized in this analysis occupies 4.5 feet of cargo bay length and when added to the total payload-up length of 52.5 feet, yields a total cargo-up length of 57.0 feet.

Example No. 2 — Flight No. 4 in 1980 is a sortie mission on which the payload remains attached to the Shuttle throughout the flight. Since no OMS kit is required for this mission, the payload weight/length are equal to the cargo weight/length. The difference in the up and down weight on this flight is a result of consumables expended on orbit (Shuttle RCS propellant and Shuttle power expendables chargeable to the payload, fuel cell water, ECS reserves, experiment expendables, and condensate dumped just prior to return). The lengths shown for Spacelab plus pallet include the tunnel length.

Example No. 3 — Flight No. 9 in 1981 requires a Tug to accomplish the mission. As shown, the total payload-up weight is 3111 pounds and the Shuttle cargo-up weight is 57 628 pounds. The Shuttle cargo weight includes the payload weight (3111 pounds), the Tug inert weight (6284 pounds), and the Tug propellant (48 233 pounds) for this mission required to deliver the payloads to their destination and return the Tug to the near vicinity of the Shuttle. The cargo-up length is the sum of the payload lengths (22.5 feet) and the Tug length (35 feet). Since no payloads are returned on this flight, the Shuttle cargo-down weight consists only of the empty Tug (6284 pounds).

TABLE 4. SHUTTLE CARGO MANIFEST

1980

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP	AST-6	LARGE SPACE TELESCOPE	CDR-N	20161	36.3/12.0	340/ 340/ 28.5		35691	57.0	.679
			LS-1	LIFE SCIENCES MODULE	LCR-N	682	13.0/ 2.2	300/ 300/ 28.5				
			EOP-6A	MINI-LAGEOS	CDE-N	225	1.6/ 1.6	350/ 350/ 28.5				
			EOP-6A	MINI-LAGEOS	CDE-N	225	1.6/ 1.6	350/ 350/ 28.5				
		DN	AST-1A	EXPLORER - LEO	CDR	640	12.2/ 2.6	297/ 297/ 28.5		7288	29.8	
			AST-3	SOLAR PHYSICS MISSION	LCR	4146	13.1/11.6	270/ 270/ 28.5				
2	KSC	UP	AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5		12476	42.8	.425
			LS-1	LIFE SCIENCES MODULE	LCR-N	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-3	SOLAR PHYSICS MISSION	LCR-R	4281	13.1/11.6	270/ 270/ 28.5				
		DN	AST-4	HEAO C	CDR	6064	18.1/ 9.0	250/ 250/ 28.5		8566	22.6	
3	KSC	UP	EO-3D	EARTH OBS. SAT.	LCR-N	8630	36.0/10.2	300/ 300/ 28.5		20413	58.6	.512
			AST-4	HEAO C	CDR-R	6064	18.1/ 9.0	250/ 250/ 28.5				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5		3814	30.5	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
4	KSC	UP	AST-11A	SOLAR PHYSICS (P)	LCR-N	21055	25.0/14.0	210/ 210/ 28.5		21055	25.0	.470
		DN	AST-11A	SOLAR PHYSICS (P)	LCR	19323	25.0/14.0	210/ 210/ 28.5		19323	25.0	
5	KSC	UP	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR-N	31227	55.0/14.0	120/ 120/ 28.5		31227	55.0	.501
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR-N							
		DN	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR	28242	55.0/14.0	120/ 120/ 28.5		28242	55.0	
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR							

NOTES: ● SUBSCRIPT D = DOD FLIGHT

● FLIGHT NUMBERS DO NOT REPRESENT A PRIORITY OR A SEQUENCE OF FLIGHTS

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1980

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
6	KSC	UP	LS-2A7	LIFE SCIENCE (L)	LCR-N	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A7	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
7	KSC	UP	LS-2A7	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A7	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
8	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-N	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
9	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-N	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
10	KSC	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-N	27002	60.0/14.0	180/ 180/ 55.0		27002	60.0	.583
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	180/ 180/ 55.0		26138	60.0	
11	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-N	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	
12	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-N	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1980

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-N	26502	60.0/14.0	180/ 180/ 28.5		26502	60.0	.504
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 28.5		25638	60.0	
14	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-N	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1981

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP	PL-1O	INNERPLANETARY FOLLOW-ON	LCE-N	2772	11.5/ 8.4	ESCAPE	ITUG	30305	60.0	.482
			SP-1B	SPACE PROCESSING (P)	LCR-N	6171	5.0/14.0	160/ 160/ 28.5	B-II			
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
2	KSC	UP	PL-1O	INNERPLANETARY FOLLOW-ON	LCE-N	2772	11.5/ 8.4	ESCAPE	ITUG	30305	60.0	.482
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5	B-II			
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
3	KSC	UP	PL-18	PIONEER SATRN/URAN FLYBY	CDE-N	1146	10.5/10.0	ESCAPE	XTUG	61755	50.5	.983
			SP-1C	SPACE PROCESSING (P)	LCR-N	5121	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	160/ 160/ 28.5		4189	5.0	
4	KSC	UP	PL-19	MARINER JUPITER ORB.	LCE-N	6888	25.0/14.7	ESCAPE	XTUG	40480	60.0	.644
		DN								0	.0	
5	KSC	UP	PL-19	MARINER JUPITER ORB.	LCE-N	6888	25.0/14.7	ESCAPE	XTUG	40480	60.0	.644
		DN								0	.0	
6	KSC	UP	PHY-1B	EXPLORER MEDIUM ALT.	CDR-N	852	12.8/ 5.0	200CE/ 1000/ 28.5	ITUG	60127	58.8	.957
			EO-4A	SEOS R AND D	CDR-N	3085	11.0/ 7.4	SYNC.EQ.				
		DN							ITUG	6284	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1981

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
7	KSC	UP	PHY-3A	ENVIRON. PERTUB. SAT.	CDR-N.	3846	15.8/ 7.0	690/ 690/ 55.0	ITUG	39255	55.8	.712
			SP-1C	SPACE PROCESSING (P)	LCR-R.	5121	5.0/14.0	160/ 160/ 55.0				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	160/ 160/ 55.0	ITUG	10473	40.0	
8	KSC	UP	EOP-9	MAGNETIC MONITOR SAT.	LCR-N.	915	10.2/ 5.8	1080/ 540/ 28.0	ITUG	54743	56.3	.871
			NN/D-2A	U.S. DOMCOMSAT	LCE-N.	1057	11.1/ 7.6	SYNC.EQ.				
		DN							ITUG	6284	35.0	
9	KSC	UP	NN/D-2A	U.S. DOMCOMSAT	LCE-N.	1057	11.1/ 7.6	SYNC.EQ.	ITUG	57628	57.5	.917
			NN/D-3	DISASTER WARNING SAT.	LCR-N.	2054	11.4/ 8.2	SYNC.EQ.				
		DN							ITUG	6284	35.0	
10	KSC	UP	NN/D-4	TRAFFIC MANAGEMENT	LCE-N.	1422	12.5/10.3	SYNC.EQ.	ITUG	56882	60.0	.905
			NN/D-4	TRAFFIC MANAGEMENT	LCE-N.	1422	12.5/10.3	SYNC.EQ.				
		DN							ITUG	6284	35.0	
11	KSC	UP	NN/D-5	FOREIGN COMSAT	CDR-N.	982	12.2/ 5.8	SYNC.EQ.	ITUG	53938	57.5	.858
			NN/D-9	FOREIGN SYNC. METEOROL.	CDR-N.	807	10.3/ 6.0	SYNC.EQ.				
		DN							ITUG	6284	35.0	
12	KSC	UP	NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR-N.	807	10.3/ 6.0	SYNC.EQ.	ITUG	52624	58.3	.837
			LS-1	LIFE SCIENCES MODULE	LCR-R.	882	13.0/ 2.2	300/ 300/ 28.5				
		DN							ITUG	6284	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1981

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	AST-6V	LST REVISIT	CDR-N	3500	5.0/14.0	340/ 340/ 28.5		13345	22.5	.435
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
		DN	AST-1A	EXPLORER - LEO	CDR	640	12.2/ 2.6	297/ 297/ 28.5		7282	33.9	
			AST-1A	EXPLORER - LEO	CDR	640	12.2/ 2.6	297/ 297/ 28.5				
			AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5				
14	KSC	UP	AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5		5104	16.7	.345
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5		3814	30.5	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
15	KSC	UP								0	0	.281
		DN	ST-1	LONG DURATION EXP. FAC.	CDR	10200	35.5/14.0	270/ 270/ 28.5		10200	35.5	
16	KSC	UP	AST-10A	STELLAR ASTRONOMY (P)	LCR-N	31857	50.0/14.0	162/ 162/ 28.5		31857	50.0	.548
		DN	AST-10A	STELLAR ASTRONOMY (P)	LCR	30225	50.0/14.0	162/ 162/ 28.5		30225	50.0	
17	KSC	UP	AST-11A	SOLAR PHYSICS (P)	LCR-R	21055	25.0/14.0	210/ 210/ 28.5		21055	25.0	.470
		DN	AST-11A	SOLAR PHYSICS (P)	LCR	19323	25.0/14.0	210/ 210/ 28.5		19323	25.0	
18	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-N	22506	30.0/14.0	120/ 120/ 55.0		22506	30.0	.458
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		20434	30.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1981

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
19	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-N	20720	27.0/14.0	120/ 120/ 28.5		20720	27.0	.379
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		18138	27.0	
20	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-N	29002	60.0/14.0	200/ 200/ 28.5		29002	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	
21	KSC	UP	LS-2A7	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A7	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
22	KSC	UP	LS-2A7	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A7	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
23	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
24	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
25	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-N	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1981

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
26	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-N	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
27	KSC	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	180/ 180/ 55.0		27002	60.0	.583
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	180/ 180/ 55.0		26138	60.0	
28	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	
29	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
30	KSC	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 28.5		26502	60.0	.504
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 28.5		25638	60.0	
31	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-N	26798	45.0/14.0	162/ 162/ 28.5		26798	45.0	.488
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		25166	45.0	
32	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
33D	KSC	UP							ITUG			
		DN							ITUG			
34D	KSC	UP							ITUG			
		DN							ITUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1982

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP	PHY-1C	EXPLORER HIGH ALT.	LCE-N	1225	10.4/ 6.1	ESCAPE	ITUG	23675	58.9	.377
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5	B-II			
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
2	KSC	UP	NN/D-2A	U.S. DOMCOMSAT	LCE-N	1057	11.1/ 7.6	SYNC.EQ.	ITUG	54846	57.2	.873
			NN/D-2A	U.S. DOMCOMSAT	LCE-N	1057	11.1/ 7.6	SYNC.EQ.				
		DN							ITUG	6284	35.0	
3	KSC	UP	NN/D-3	DISASTER WARNING SAT.	LCR-N	2054	11.4/ 8.2	SYNC.EQ.	ITUG	58646	58.9	.933
			NN/D-4	TRAFFIC MANAGEMENT	LCE-N	1422	12.5/10.3	SYNC.EQ.				
		DN							ITUG	6284	35.0	
4	KSC	UP	NN/D-5	FOREIGN COMSAT	CDR-N	982	12.2/ 5.8	SYNC.EQ.	ITUG	53938	57.5	.858
			NN/D-9	FOREIGN SYNC. METEOROL.	CDR-N	807	10.3/ 6.0	SYNC.EQ.				
		DN							ITUG	6284	35.0	
5	KSC	UP	NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR-N	807	10.3/ 6.6	SYNC.EQ.	ITUG	52574	57.5	.836
			AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5				
		DN							ITUG	6284	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1982

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
6	KSC	UP	AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5		42131	58.0	.750
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-5	HEAO	CDR-N	17434	17.5/14.0	200/ 200/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	340/ 340/ 28.5				
		DN	AST-1A	EXPLORER - LEO	CDR	640	12.2/ 2.6	297/ 297/ 28.5		16027	39.8	
			AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5				
			AST-3	SOLAR PHYSICS MISSION	LCR	4146	13.1/11.6	270/ 270/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	340/ 340/ 28.5				
7	KSC	UP	AST-3	SOLAR PHYSICS MISSION	LCR-R	4281	13.1/11.6	270/ 270/ 28.5		25948	58.1	.573
			ST-1	LONG DURATION EXP. FAC.	CDR-R	10200	35.5/14.0	270/ 270/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	270/ 270/ 28.5				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	682	13.0/ 2.2	300/ 300/ 28.5		8003	35.5	
			LS-1	LIFE SCIENCES MODULE	LCR	682	13.0/ 2.2	300/ 300/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	270/ 270/ 28.5				
8	WTR	UP	EO-3BV	EARTH OBS. SAT. REVISIT	LCR-N	3500	5.0/14.0	300/ 300/ 99.0		19713	14.5	.831
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3A	EARTH OBS. SATELLITE	LCR	6213	36.0/10.2	300/ 300/ 99.0		17454	50.5	
			EO-3BV	EARTH OBS. SAT. REVISIT	LCR	3500	5.0/14.0	300/ 300/ 99.0				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				
9	KSC	UP	SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	270/ 270/ 28.5		5121	5.0	.343
		DN	ST-1	LONG DURATION EXP. FAC.	CDR	10200	35.5/14.0	270/ 270/ 28.5		14389	40.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	270/ 270/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1982

FLT NO	LNCH SITE	TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
10	KSC	UP	AST-10A	STELLAR ASTRONOMY (P)	LCR-R	31857	50.0/14.0	162/ 162/ 28.5		31857	50.0	.548
		DN	AST-10A	STELLAR ASTRONOMY (P)	LCR	30225	50.0/14.0	162/ 162/ 28.5		30225	50.0	
11	KSC	UP	AST-10B	STELLAR ASTRONOMY (P)	LCR-N	28526	45.0/14.0	162/ 162/ 28.5		33647	50.0	.569
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	162/ 162/ 28.5				
		DN	AST-10B	STELLAR ASTRONOMY (P)	LCR	26894	45.0/14.0	162/ 162/ 28.5		31087	50.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	162/ 162/ 28.5				
12	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-N	24771	50.0/14.0	210/ 210/ 28.5		30942	55.0	.589
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	210/ 210/ 28.5				
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039	50.0/14.0	210/ 210/ 28.5		28278	55.0	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	210/ 210/ 28.5				
13	KSC	UP	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR-R	31227	55.0/14.0	120/ 120/ 28.5		31227	55.0	.501
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR-R							
		DN	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR	28242	55.0/14.0	120/ 120/ 28.5		28242	55.0	
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR							
14	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		34848	40.0	.621
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20439	30.0/14.0	120/ 120/ 55.0		33912	40.0	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1982

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
15	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		36083	42.0	.557
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		30705	42.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 28.5				
16	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 28.5		29002	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	
17	KSC	UP	LS-2A7	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A7	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
18	KSC	UP	LS-2A7	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A7	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
19	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
20	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1982

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
21	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
22	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
23	KSC	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	180/ 180/ 55.0		27002	60.0	.583
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	180/ 180/ 55.0		26138	60.0	
24	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	
25	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
26	KSC	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 28.5		26502	60.0	.504
		DN	NN/D-16B	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 28.5		25638	60.0	
27	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5		26798	45.0	.488
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25168	45.0/14.0	162/ 162/ 28.5		25168	45.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1982

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
28	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	
29D	KSC	UP							ITUG			
		DN							ITUG			
30D	KSC	UP							ITUG			
		DN							ITUG			
31D	KSC	UP							ITUG			
		DN							ITUG			
32D	KSC	UP							ITUG			
		DN							ITUG			
33D	KSC	UP							ITUG			
		DN							ITUG			
34D	KSC	UP							ITUG			
		DN							ITUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1982

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
35D	KSC	UP							ITUG			
		DN							ITUG			
36D	KSC	UP							ITUG			
		DN							ITUG			
37D	KSC	UP							ITUG			
		DN							ITUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP	PHY-1C	EXPLORER HIGH ALT.	LCE-N	1225	10.4/ 6.1	ESCAPE	ITUG	23675	58.9	.377
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5	B-II			
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
2	KSC	UP	PL-1D	INNERPLANETARY FOLLOW-ON	LCE-N	2772	11.5/ 8.4	ESCAPE	ITUG	30305	60.0	.482
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5	B-II			
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
3	KSC	UP	PL-11	VENUS RADAR MAPPER	LCE-N	13485	19.4/14.7	ESCAPE	XTUG	48659	54.4	.774
		DN								0	.0	
4	KSC	UP	PL-11	VENUS RADAR MAPPER	LCE-N	13485	19.4/14.7	ESCAPE	XTUG	48659	54.4	.774
		DN								0	.0	
5	KSC	UP	AST-1B	EXPLORER - SYNC.	CDR-N	649	12.2/ 2.6	19323/19323/ 28.5	ITUG	43896	59.4	.698
			AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5				
		DN							ITUG	6284	35.0	
6	KSC	UP	EO-4A	SEOS R AND D	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	ITUG	59441	55.7	.946
			EO-5E	SPECIAL PURPOSE SAT.	LCE-N	676	9.7/ 4.7	SYNC.EQ.				
		DN							ITUG	6284	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
7	KSC	UP	NN/D-2C	TRACKING AND DATA RELAY	CDR-N	974	17.9/ 6.3	SYNC.EQ.	ITUG	57834	57.9	.920
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
8	KSC	UP	NN/D-2C	TRACKING AND DATA RELAY	CDR-N	974	17.9/ 6.3	SYNC.EQ.	ITUG	57834	57.9	.920
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
9	KSC	UP	NN/D-2C	TRACKING AND DATA RELAY	CDR-N	974	17.9/ 6.3	SYNC.EQ.	ITUG	57834	57.9	.920
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	ITUG	11523	40.0	
10	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	ITUG	51498	47.2	.978
		DN							ITUG	6284	35.0	
11	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	ITUG	51498	47.2	.978
		DN							ITUG	6284	35.0	
12	KSC	UP	NN/D-2A	U.S. DOMCOMSAT	LCE-N	1057	11.1/ 7.6	SYNC.EQ.	ITUG	55864	58.6	.889
			NN/D-4	TRAFFIC MANAGEMENT	LCE-N	1422	12.9/10.3	SYNC.EQ.				
		DN							ITUG	6284	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	NN/D-5	FOREIGN COMSAT	CDR-N	982	12.2/ 5.8	SYNC.EQ.	ITUG	53938	57.5	.858
			NN/D-10	GEOSYNC. OPERATIONAL MET	CDR-N	807	10.3/ 6.0	SYNC.EQ.				
		DN							ITUG	6284	35.0	
14	WTR	UP	PHY-2A	GRAVITY/RELATIVITY SAT.	LCE-N	2514	13.6/12.5	500/ 500/ 90.0		33887	25.9	.983
		DN								5499	12.3	
15	KSC	UP	AST-9A	FOC. X RAY TELESCOPE	CDR-N	17434	17.5/14.0	270/ 270/ 28.5		39761	58.0	.724
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-5V	HEAO REVISIT	CDR-N	3500	5.0/14.0	200/ 200/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	270/ 270/ 28.5				
		DN	AST-6	LARGE SPACE TELESCOPE	CDR	20087	36.3/12.0	340/ 340/ 28.5		30278	50.8	
			AST-5V	HEAO REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	270/ 270/ 28.5				
16	KSC	UP	AST-6	LARGE SPACE TELESCOPE	CDR-R	20161	36.3/12.0	340/ 340/ 28.5		39085	45.8	.716
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	340/ 340/ 28.5				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5		9053	35.5	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	340/ 340/ 28.5				
17	WTR	UP	EO-3A	EARTH OBS. SATELLITE	LCR-R	8630	36.0/10.2	300/ 300/ 99.0		24012	45.5	.903
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3B	EARTH OBS. SATELLITE	LCR	8213	36.0/10.2	300/ 300/ 99.0		12904	45.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 99.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
18	WTR	UP	SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0		20283	14.5	.824
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT	LCR	6213	36.0/10.2	300/ 300/ 97.0		17093	50.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 97.0				
19	WTR	UP	NN/D-11	EARTH RESOURCES SAT	LCR-R	8630	36.0/10.2	300/ 300/ 97.0		29940	50.5	.984
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT	LCR	6213	36.0/10.2	300/ 300/ 97.0		17093	50.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 97.0				
20	WTR	UP								0	0	.419
		DN	EOP-8	VECTOR MAGNETOMETER SAT	LCR	1080	10.4/ 8.2	216/ 216/ 90.0		3240	31.2	
			EOP-8	VECTOR MAGNETOMETER SAT	LCR	1080	10.4/ 8.2	216/ 216/ 90.0				
			EOP-8	VECTOR MAGNETOMETER SAT	LCR	1080	10.4/ 8.2	216/ 216/ 90.0				
21	KSC	UP	AST-10A	STELLAR ASTRONOMY (P)	LCR-R	31857	50.0/14.0	162/ 162/ 28.5		31857	50.0	.548
		DN	AST-10A	STELLAR ASTRONOMY (P)	LCR	30225	50.0/14.0	162/ 162/ 28.5		30225	50.0	
22	KSC	UP	AST-10B	STELLAR ASTRONOMY (P)	LCR-R	28526	45.0/14.0	162/ 162/ 28.5		28526	45.0	.509
		DN	AST-10B	STELLAR ASTRONOMY (P)	LCR	26894	45.0/14.0	162/ 162/ 28.5		26894	45.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
23	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-R	24771	50.0/14.0	210/ 210/ 28.5		24771	50.0	.515
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039	50.0/14.0	210/ 210/ 28.5		23039	50.0	
24	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-R	24771	50.0/14.0	210/ 210/ 28.5		24771	50.0	.515
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039	50.0/14.0	210/ 210/ 28.5		23039	50.0	
25	KSC	UP	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR-R	31227	55.0/14.0	120/ 120/ 28.5		31227	55.0	.501
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR-R							
		DN	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR	28242	55.0/14.0	120/ 120/ 28.5		28242	55.0	
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR							
26	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		22506	30.0	.458
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		20434	30.0	
27	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		20720	27.0	.379
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		18138	27.0	
28	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-N	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
29	KSC	UP	LS-2A3O	LIFE SCIENCE (L)	LCR-N	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3O	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
30	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
31	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
32	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
33	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
34	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
35	KSC	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	180/ 180/ 55.0		27002	60.0	.583
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	180/ 180/ 55.0		26138	60.0	
36	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
37	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
38	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-N	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25638	60.0	
39	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5		26798	45.0	.488
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		25166	45.0	
40	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25719	60.0	
41	KSC	UP	NN/D-16D	GPL 2 (L+P)	LCR-N	26261	60.0/14.0	200/ 200/ 28.5		26261	60.0	.522
		DN	NN/D-16D	GPL 2 (L+P)	LCR	25497	60.0/14.0	200/ 200/ 28.5		25497	60.0	
42D	WTR	UP										
		DN										
43D	WTR	UP							ITUG			
		DN							ITUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
44D	WTR	UP										
		DN										
45D	WTR	UP							ITUG			
		DN							ITUG			
46D	KSC	UP							ITUG			
		DN							ITUG			
47D	KSC	UP							ITUG			
		DN							ITUG			
48D	KSC	UP							ITUG			
		DN							ITUG			
49D	KSC	UP							ITUG			
		DN							ITUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
50D	WTR	UP							ITUG			
		DN							ITUG			
51D	WTR	UP							ITUG			
		DN							ITUG			
52D	WTR	UP							ITUG			
		DN							ITUG			
53D	KSC	UP							ITUG			
		DN							ITUG			
54D	KSC	UP							ITUG			
		DN							ITUG			
55D	KSC	UP							ITUG			
		DN							ITUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983														
		PAYLOAD								ENERGY	SHUTTLE CARGO		SHUTTLE
FLT NO	LNCH SITE	TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	STAGE	WEIGHT (LB)	LENGTH (FT)	PERF LOAD FACTOR
56D	KSC	UP							ITUG			
		DN							ITUG			
57D	KSC	UP							ITUG			
		DN							ITUG			
58D	WTR	UP							ITUG			
		DN							ITUG			
59D	KSC	UP							ITUG			
		DN							ITUG			
60D	KSC	UP							ITUG			
		DN							ITUG			
61D	WTR	UP										
		DN										
62D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1983												
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
63D	WTR	UP										
		DN										
64D	WTR	UP										
		DN										
65D	WTR	UP										
		DN										
66D	WTR	UP										
		DN										
67D	WTR	UP										
		DN										
68D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1994

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP	PL-2D	PIONEER JUPITER PROBE	COE-N	1169	0.5/1.0	ESCAPE	TUG B-II	52709	54.0	.839
		DN							TUG	6297	35.0	
2	KSC	UP	PL-2D	PIONEER JUPITER PROBE	COE-N	1169	0.5/1.0	ESCAPE	TUG B-II	60185	54.0	.958
		DN							TUG	6297	35.0	
3	KSC	UP	AST-1A	EXPLORER - LEO	CDR-N	649	12.2/ 2.6	297/ 297/ 28.5	TUG	43159	47.2	.687
		DN	AST-1B	EXPLORER - SYNC.	CDR	640	12.2/ 2.6	19323/19323/ 28.5	TLG	7785	60.0	
			PHY-1B	EXPLORER MEDIUM ALT.	CDR	848	12.8/ 5.0	2000/ 1000/ 28.5				
4	WTR	UP	EO-5C	SPECIAL PURPOSE SAT.	LCE-N	676	9.7/ 4.7	280/ 280/ 90.0	TLG	16167	49.7	.476
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 90.0				
		DN	PHY-1A	EXPLORER UPPER ATMOS.	CDR	1046	13.3/ 4.0	1900/ 140/ 90.0	TLG	12582	53.3	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 90.0				
5	WTR	UP	PHY-1A	EXPLORER UPPER ATMOS.	CDR-R	1597	13.3/ 4.0	1900/ 140/ 90.0	TLG	25870	53.3	.762
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 90.0				
		DN	EO-6	TIROS N-P	CDR	1614	15.3/ 8.0	790/ 790/102.0	TLG	13159	55.3	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 90.0				
6	KSC	UP	PHY-1B	EXPLORER MEDIUM ALT.	CDR-R	852	12.8/ 5.0	2000/ 1000/ 28.5	TLG	50860	47.2	.94
		DN	PHY-3A	ENVIRON. PERTUB. SAT.	CDR	2505	15.8/ 7.0	550/ 5400/ 55.0	TUG	9985	50.8	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
7	KSC	UP	PHY-3A	ENVIRON. PERTUB. SAT.	CDR-R	3846	15.8/ 7.0	6900/ 6900/ 55.0	TLG	38202	55.8	.692
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 55.0				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 55.0	TLG	11536	40.0	
8	KSC	UP	PL-7	MARS SURF. SAMP. RETURN	LCE-N	10640	23.5/14.7	ESCAPE	TUG	62517	58.5	.995
		DN							TLG	6297	35.0	
9	KSC	UP	PL-7	MARS SURF. SAMP. RETURN	LCE-N	10640	23.5/14.7	ESCAPE	TLG	62517	58.5	.995
		DN							TUG	6297	35.0	
10	KSC	UP	LUN-2	AUTO. LUNAR ORBITER	LCE-N	2475	11.2/ 7.8	ESCAPE	TUG	42491	51.2	.676
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	TUG	11536	40.0	
11	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	62180	59.7	.989
			NN/D-4	TRAFFIC MANAGEMENT	LCE-N	1422	12.5/10.3	SYNC.EQ.				
		DN	EOP-9	MAGNETIC MONITOR SAT.	LCR	815	10.2/ 5.8	1080/ 540/ 28.0	TLG	7768	58.2	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
12	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	59648	47.2	.949
		DN	NN/D-5	FOREIGN COMSAT	CDR	830	12.2/ 5.8	SYNC.EQ.	TUG	7127	47.2	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
13	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	62248	59.4	.990
			NN/D-5	FOREIGN COMSAT	CDR-R	982	12.2/ 5.8	SYNC.EQ.				
		DN	NN/D-5	FOREIGN COMSAT	CDR	830	12.2/ 5.8	SYNC.EQ.	TLG	7127	47.2	
14	KSC	UP	NN/D-2B	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TUG	59648	47.2	.949
		DN	NN/D-5	FOREIGN COMSAT	CDR	830	12.2/ 5.8	SYNC.EQ.	TLG	7127	47.2	
15	WTR	UP							TUG	9467	35.0	.352
		DN	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR	1899	12.4/10.2	920/ 920/103.0	TUG	10095	59.8	
			NN/D-8	ENVIRONMENTAL MON. SAT.	LCR	1899	12.4/10.2	920/ 920/103.0				
16	WTR	UP	SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/103.0	TUG	15248	40.0	.567
		DN	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR	1899	12.4/10.2	920/ 920/103.0	TLG	13435	52.4	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/103.0				
17	KSC	UP	LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5	TLG	52176	48.0	.830
		DN	NN/D-9	FOREIGN SYNC. METEOROL.	CDR	765	10.3/ 6.0	SYNC.EQ.	TUG	7827	55.6	
			NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR	755	10.3/ 6.0	SYNC.EQ.				
18	KSC	UP	NN/D-9	FOREIGN SYNC. METEOROL.	CDR-R	817	10.3/ 6.0	SYNC.EQ.	TUG	54341	58.3	.865
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
		DN	NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR	765	10.3/ 6.0	SYNC.EQ.	TUG	7827	55.6	
			NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR	765	10.3/ 6.0	SYNC.EQ.				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
19	KSC	UP	AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5		27731	50.0	.592
			AST-9AV	FOC. X RAY REVISIT	CDR-N	3500	5.0/14.0	270/ 270/ 28.5				
			ST-1	LONG DURATION EXP. FAC.	CDR-R	10200	35.5/14.0	270/ 270/ 28.5				
		DN	AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5		14304	40.6	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
			AST-3	SOLAR PHYSICS MISSION	LCR	4146	13.1/11.6	270/ 270/ 28.5				
			AST-9AV	FOC. X RAY REVISIT	CDR	3500	5.0/14.0	270/ 270/ 28.5				
20	WTR	UP	EO-3CV	EARTH OBS. SAT. REVISIT	LCR-N	3500	5.0/14.0	300/ 300/ 99.0		25277	19.5	.925
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3CV	EARTH OBS. SAT. REVISIT	LCR	3500	5.0/14.0	300/ 300/ 99.0		15430	19.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 99.0				
21	WTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R	8630	36.0/10.2	300/ 300/ 97.0		29940	50.5	.984
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	6213	36.0/10.2	300/ 300/ 97.0		17093	50.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4199	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 97.0				
22	KSC	UP	AST-3	SOLAR PHYSICS MISSION	LCR-R	4281	13.1/11.6	270/ 270/ 28.5		4281	13.1	.331
		DN	ST-1	LONG DURATION EXP. FAC.	CDR	10200	35.5/14.0	270/ 270/ 28.5		10200	35.5	
23	KSC	UP	AST-10C	STELLAR ASTRONOMY (P)	LCR-N	30811	30.0/14.0	162/ 162/ 28.5		30811	30.0	.536
		DN	AST-10C	STELLAR ASTRONOMY (P)	LCR	29179	30.0/14.0	162/ 162/ 28.5		29179	30.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
24	KSC	UP	AST-1007	STELLAR ASTRONOMY (P)	LCR-N	27287.	47.0/14.0	162/ 162/ 28.5		32408.	52.0	.554
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	162/ 162/ 28.5				
		DN	AST-1007	STELLAR ASTRONOMY (P)	LCR	25655.	47.0/14.0	162/ 162/ 28.5		29844.	52.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	162/ 162/ 28.5				
25	KSC	UP	AST-10E	STELLAR ASTRONOMY (P)	LCR-N	25460.	40.0/14.0	162/ 162/ 28.5		30581.	45.0	.532
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	162/ 162/ 28.5				
		DN	AST-10E	STELLAR ASTRONOMY (P)	LCR	23828.	40.0/14.0	162/ 162/ 28.5		28017.	45.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	162/ 162/ 28.5				
26	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-R	24771.	50.0/14.0	210/ 210/ 28.5		29892.	55.0	.576
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	210/ 210/ 28.5				
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039.	50.0/14.0	210/ 210/ 28.5		27228.	55.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	210/ 210/ 28.5				
27	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-R	24771.	50.0/14.0	210/ 210/ 28.5		24771.	50.0	.515
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039.	50.0/14.0	210/ 210/ 28.5		23039.	50.0	
28	KSC	UP	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR-R	31227.	55.0/14.0	120/ 120/ 28.5		31227.	55.0	.501
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR-R							
		DN	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR	28242.	55.0/14.0	120/ 120/ 28.5		28242.	55.0	
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR							
29	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22505.	30.0/14.0	120/ 120/ 55.0		22505.	30.0	.459
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434.	30.0/14.0	120/ 120/ 55.0		20434.	30.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
30	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		20720	27.0	.379
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		18138	27.0	
31	KSC	UP	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR-N	29002	60.0/14.0	200/ 200/ 55.0		29002	60.0	.635
		DN	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 55.0		28238	60.0	
32	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
33	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
34	KSC	UP	LS-2A30	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A30	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
35	KSC	UP	LS-2A30	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A30	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
36	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
37	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
38	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
39	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
40	WTR	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-N	27002	60.0/14.0	160/ 160/ 90.0		27002	60.0	.803
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	160/ 160/ 90.0		26138	60.0	
41	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	
42	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
43	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.924
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25638	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
44	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5		26798	45.0	.488
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		25166	45.0	
45	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	
46D	WTR	UP										
		DN										
47D	WTR	UP							TLG			
		DN							TUG			
48D	WTR	UP										
		DN										
49D	WTR	UP							TLG			
		DN							TUG			
50D	KSC	UP							TLG			
		DN							TLG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
51D	KSC	UP							TLG			
		DN							TLG			
52D	KSC	UP							TLG			
		DN							TUG			
53D	KSC	UP							TUG			
		DN							TUG			
54D	KSC	UP							TUG			
		DN							TUG			
55D	KSC	UP							TUG			
		DN							TUG			
56D	KSC	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
57D	WTR	UP							TUG			
		DN							TUG			
58D	WTR	UP							TUG			
		DN							TUG			
59D	KSC	UP							TUG			
		DN							TUG			
60D	KSC	UP							TUG			
		DN							TUG			
61D	KSC	UP							TUG			
		DN							TUG			
62D	KSC	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/C (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
63D	KSC	UP							TUG			
		DN							TUG			
64D	KSC	UP							TUG			
		DN							TUG			
65D	KSC	UP							TUG			
		DN							TUG			
66D	KSC	UP							TUG			
		DN							TUG			
67D	WTR	UP										
		DN										
68D	WTR	UP										
		DN										
69D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1984

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
70D	WTR	UP										
		DN										
71D	WTR	UP										
		DN										
72D	WTR	UP										
		DN										
73D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1995

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP							TUG	52328.	35.0.	.833
		DN							TUG	6297.	35.0.	
2	KSC	UP	PL-12	VENUS BUOYANT STATION	LCE-N	20617.	17.3/14.7	ESCAPE	TUG	35914.	52.3.	.571
		DN							TUG	6297.	35.0.	
3	KSC	UP							TUG	52328.	35.0.	.833
		DN							TUG	6297.	35.0.	
4	KSC	UP	PL-12	VENUS BUOYANT STATION	LCE-N	20617.	17.3/14.7	ESCAPE	TUG	35914.	52.3.	.571
		DN							TUG	6297.	35.0.	
5	KSC	UP	AST-1B	EXPLORER - SYNC.	CDR-G	649.	12.2/ 2.6	19323/19323/ 28.5	TUG	62356.	59.4.	.992
			NN/D-5	FOREIGN COMSAT	CDR-F	982.	12.2/ 5.8	SYNC.EQ.				
		DN							TUG	6297.	35.0.	
6	KSC	UP	AST-8	LARGE RADIO OBSERVATORY	CDR-N	2786.	25.0/10.0	38648/38648/ 28.5	TUG	49410.	60.0.	.786
		DN	LS-1	LIFE SCIENCES MODULE	LCP	656.	13.0/ 2.2	300/ 300/ 28.5	TLG	6953.	48.0.	
7	KSC	UP	PHY-1C	EXPLORER HIGH ALT.	LCE-N	1225.	10.4/ 6.1	ESCAPE	TUG	58936.	45.4.	.938
		DN							TLG	6297.	35.0.	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
8	KSC	UP	PL-2T	COMET HALLEY FLYBY	LCE-N	2074	13.5/12.2	ESCAPE	TLG	54746	53.5	.871
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	TLG	11536	40.0	
9	KSC	UP	EO-4A	SEOS R AND D	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	TUG	62681	59.0	.997
			NN/D-3	DISASTER WARNING SAT.	LCR-N	2054	11.4/ 8.2	SYNC.EQ.				
			EOP-6A	MINI-LAGEOS	CDE-N	225	1.6/ 1.6	350/ 350/ 28.5				
		DN	NN/D-5	FOREIGN COMSAT	CDR	830	12.2/ 5.8	SYNC.EQ.	TLG	7127	47.2	
10	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TUG	62312	57.5	.991
			NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR-R	807	10.3/ 6.0	SYNC.EQ.				
		DN	NN/D-9	FOREIGN SYNC. METEOROL.	CDR	765	10.3/ 6.0	SYNC.EQ.	TUG	7719	58.3	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
11	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TUG	60909	59.4	.968
			AST-1A	EXPLORER - LEO	CDR-N	649	12.2/ 2.6	297/ 297/ 28.5				
		DN	NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR	765	10.3/ 6.0	SYNC.EQ.	TUG	7062	45.3	
12	KSC	UP	NN/D-28	U.S. DOMCOMSAT	CDR-N	4499	12.2/ 8.3	SYNC.EQ.	TLG	62387	53.8	.993
			EOP-6A	MINI-LAGEOS	CDE-N	225	1.6/ 1.6	350/ 350/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	160/ 160/ 28.5	TUG	10486	40.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	NN/D-6	COMMUNICATIONS R A,D D	LCE-N	3871	13.1/11.6	SYNC EQ	TLG	60537	53.1	.963
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	TLG	11536	40.0	
14	WTR	UP	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR-R	2024	12.4/10.2	920/ 920/103.0	TUG	21059	58.7	.783
			EO-5D	SPECIAL PURPOSE SAT.	LCE-N	676	9.7/ 4.7	400/ 400/ 90.0				
			EOP-6C	MINI-LAGEOS	CDE-N	225	1.6/ 1.6	350/ 350/ 90.0				
		DN							TLG	6297	35.0	
15	KSC	UP	AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5		24862	45.5	.561
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-5V	HEAO REVISIT	CDR-R	3500	5.0/14.0	200/ 200/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	340/ 340/ 28.5				
		DN	AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5		14741	19.5	
			AST-5V	HEAO REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	340/ 340/ 28.5				
16	WTR	UP	EO-3AV	EARTH OBS. SAT. REVISIT	LCR-N	3500	5.0/14.0	300/ 300/ 99.0		29371	50.5	.994
			EO-3B	EARTH OBS. SATELLITE	LCR-R	8630	36.0/10.2	300/ 300/ 99.0				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3AV	EARTH OBS. SAT. REVISIT	LCR	3500	5.0/14.0	300/ 300/ 99.0		17454	50.5	
			EO-3C	EARTH OBS. SAT.	LCR	6213	36.0/10.2	300/ 300/ 99.0				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
17	KSC	UP	EOP-6B	MINI-LAGEOS	CDE-N	225.	1.6/ 1.6	350/ 350/ 55.0		42883.	42.7	.867
			EOP-6B	MINI-LAGEOS	CDE-N	225.	1.6/ 1.6	350/ 350/ 55.0				
			PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506.	30.0/14.0	120/ 120/ 55.0				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171.	5.0/14.0	350/ 350/ 55.0				
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434.	30.0/14.0	120/ 120/ 55.0		28175.	39.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0	350/ 350/ 55.0				
18	WTR	UP	EOP-6C	MINI-LAGEOS	CDE-N	225.	1.6/ 1.6	350/ 350/ 90.0		20302.	11.1	.772
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171.	5.0/14.0	350/ 350/ 90.0				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0	350/ 350/ 90.0		7741.	9.5	
19	WTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R	8630.	36.0/10.2	300/ 300/ 97.0		29940.	50.5	.984
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	6213.	36.0/10.2	300/ 300/ 97.0		17093.	50.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	300/ 300/ 97.0				
20	KSC	UP	AST-7	LARGE SOLAR OBSERVATORY	CDR-N	27034.	58.5/15.0	190/ 190/ 28.5		27034.	58.5	.510
		DN								0.	.0	
21	KSC	UP	AST-9AV	FOC. X RAY REVISIT	CDR-R	3500.	5.0/14.0	270/ 270/ 28.5		8621.	10.0	.381
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	270/ 270/ 28.5				
		DN	AST-9AV	FOC. X RAY REVISIT	CDR	3500.	5.0/14.0	270/ 270/ 28.5		7689.	10.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	270/ 270/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT PA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
22	KSC	UP	AST-10C	STELLAR ASTRONOMY (P)	LCR-R	30811	30.0/14.0	162/ 162/ 28.5		30811	30.0	.536
		DN	AST-10C	STELLAR ASTRONOMY (P)	LCR	29179	30.0/14.0	162/ 162/ 28.5		29179	30.0	
23	WTR	UP	AST-10D7	STELLAR ASTRONOMY (P)	LCR-N	27287	47.0/14.0	120/ 120/ 90.0		32408	52.0	.841
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 90.0				
		DN	AST-10D7	STELLAR ASTRONOMY (P)	LCR	25655	47.0/14.0	120/ 120/ 90.0		29844	52.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 90.0				
24	KSC	UP	AST-10E	STELLAR ASTRONOMY (P)	LCR-R	25460	40.0/14.0	162/ 162/ 28.5		30581	45.0	.532
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	162/ 162/ 28.5				
		DN	AST-10E	STELLAR ASTRONOMY (P)	LCR	23828	40.0/14.0	162/ 162/ 28.5		28017	45.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	162/ 162/ 28.5				
25	KSC	UP	AST-10F	STELLAR ASTRONOMY (P)	LCR-N	55019	40.0/14.0	162/ 162/ 28.5		55019	40.0	.814
		DN	AST-10F	STELLAR ASTRONOMY (P)	LCR	31387	40.0/14.0	162/ 162/ 28.5		31387	40.0	
26	KSC	UP	AST-10G	STELLAR ASTRONOMY (P)	LCR-N	13005	10.0/14.0	162/ 162/ 28.5		35589	30.0	.591
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-N	6171	5.0/14.0	162/ 162/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	162/ 162/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-N	5121	5.0/14.0	162/ 162/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	162/ 162/ 28.5				
		DN	AST-10G	STELLAR ASTRONOMY (P)	LCR	11373	10.0/14.0	162/ 162/ 28.5		30219	30.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	162/ 162/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	162/ 162/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4194	5.0/14.0	162/ 162/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4194	5.0/14.0	162/ 162/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
27	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-R	24771	50.0/14.0	210/ 210/ 28.5		24771	50.0	.515
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039	50.0/14.0	210/ 210/ 28.5		23039	50.0	
28	KSC	UP	AST-11C7	SOLAR PHYSICS (P)	LCR-N	30298	40.0/14.0	210/ 210/ 28.5		30298	40.0	.582
		DN	AST-11C7	SOLAR PHYSICS (P)	LCR	28566	40.0/14.0	210/ 210/ 28.5		28566	40.0	
29	KSC	UP	AST-11C7	SOLAR PHYSICS (P)	LCR-R	30298	40.0/14.0	210/ 210/ 28.5		30298	40.0	.582
		DN	AST-11C7	SOLAR PHYSICS (P)	LCR	28566	40.0/14.0	210/ 210/ 28.5		28566	40.0	
30	KSC	UP	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR-R	31227	55.0/14.0	120/ 120/ 28.5		31227	55.0	.501
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR-R							
		DN	PHY-6A	HIGH ENERGY PHYSICS (P)	LCR	28242	55.0/14.0	120/ 120/ 28.5		28242	55.0	
			PHY-6B	HIGH ENERGY PHYSICS (P)	LCR							
31	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		20720	27.0	.379
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		18138	27.0	
32	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 28.5		29002	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	
33	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
34	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
35	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
36	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
37	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
38	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
39	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
40	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
41	KSC	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	180/ 180/ 55.0		27002	60.0	.583
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	180/ 180/ 55.0		26138	60.0	
42	WTR	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-N	25402	60.0/14.0	160/ 160/ 90.0		25402	60.0	.776
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	160/ 160/ 90.0		24539	60.0	
43	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
44	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25639	60.0	
45	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26799	45.0/14.0	162/ 162/ 28.5		26799	45.0	.488
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		25166	45.0	
46	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	
47	KSC	UP	NN/D-16D	GPL 2 (L+P)	LCR-R	26261	60.0/14.0	200/ 200/ 28.5		26261	60.0	.522
		DN	NN/D-16D	GPL 2 (L+P)	LCR	25497	60.0/14.0	200/ 200/ 28.5		25497	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
48	KSC	UP							XTUG	54910	35.0	.874
		DN								0	.0	
49	KSC	UP	PL-21	MARINER SATURN ORBITER	LCE-N	4988	39.0/14.7	ESCAPE	B-II	15022	47.5	.239
		DN								0	.0	
50	KSC	UP							XTUG	54910	35.0	.874
		DN								0	.0	
51	KSC	UP	PL-21	MARINER SATURN ORBITER	LCE-N	4988	39.0/14.7	ESCAPE	B-II	15022	47.5	.239
		DN								0	.0	
52D	WTR	UP										
		DN										
53D	WTR	UP							TLG			
		DN							TLS			
54D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
55D	WTR	UP							TUG			
		DN			CDR				TUG			
56D	KSC	UP							TUG			
		DN							TUG			
57D	KSC	UP							TLG			
		DN							TLG			
58D	KSC	UP							TLG			
		DN							TLG			
59D	KSC	UP							TLG			
		DN							TLG			
60D	KSC	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985													
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
61D	WTR	UP							TLG			
		DN							TLG			
62D	WTR	UP							TLG			
		DN							TUG			
63D	WTR	UP							TUG			
		DN							TUG			
64D	KSC	UP							TUG			
		DN							TUG			
65D	WTR	UP										
		DN										
66D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985

FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
67D	WTR	UP										
		DN										
68D	WTR	UP										
		DN										
69D	WTR	UP										
		DN										
70D	WTR	UP										
		DN										
71D	WTR	UP										
		DN										
72D	WTR	UP										
		DN										
73D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1985														
FLT NO	LNCH SITE	PAYLOAD								ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)			WEIGHT (LB)	LENGTH (FT)	
74D	WTR	UP											
		DN											

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP	PHY-2B	GRAVITY/RELATIVITY SAT.	LCE-N	1372	12.0/ 9.3	ESCAPE	TUG B-II	38095	55.5	.606
		DN							TUG	6297	35.0	
2	KSC	UP							TUG	62732	35.0	.998
		DN							TUG	6297	35.0	
3	KSC	UP	PL-22	MARINER URANUS PROBE	CDE-N	2137	25.0/15.0	ESCAPE	XTUG	46245	60.0	.736
		DN								0	0	
4	KSC	UP							TLG	62732	35.0	.998
		DN							TLG	6297	35.0	
5	KSC	UP	PL-22	MARINER URANUS PROBE	CDE-N	2137	25.0/15.0	ESCAPE	XTUG	46245	60.0	.736
		DN								0	0	
6	KSC	UP	EO-5E	SPECIAL PURPOSE SAT.	LCE-N	676	9.7/ 4.7	SYNC.EG.	TUG	62625	44.7	.996
		DN	AST-18	EXPLORER - SYNC.	CDR	640	12.2/ 2.6	19323/19323/ 28.5	TLG	6937	47.2	
7	KSC	UP	PHY-1C	EXPLORER HIGH ALT.	LCE-N	1225	10.4/ 6.1	ESCAPE	TUG	58936	45.4	.938
		DN							TLG	6297	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
8	KSC	UP	PL-10	INNERPLANETARY FOLLOW-ON	LCE-N	2772	11.5/ 8.4	ESCAPE	TLG	58177	46.5	.926
		DN							TUG	6297	35.0	
9	KSC	UP	PL-28	ASTEROID RENDEZVOUS	LCE-N	4583	20.8/14.7	ESCAPE	TUG	58673	55.8	.934
		DN							TLG	6297	35.0	
10	KSC	UP	PL-28	ASTEROID RENDEZVOUS	LCE-N	4583	20.8/14.7	ESCAPE	TLG	58673	55.8	.934
		DN							TUG	6297	35.0	
11	KSC	UP	LUN-2	AUTO. LUNAR ORBITER	LCE-N	2475	11.2/ 7.8	ESCAPE	TUG	42491	51.2	.676
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	TUG	11536	40.0	
12	KSC	UP	EOP-9	MAGNETIC MONITOR SAT.	LCR-R	915	10.2/ 5.8	1080/ 540/ 28.0	TLG	62783	57.4	.999
			NN/D-5	FOREIGN COMSAT	CDR-R	982	12.2/ 5.8	SYNC.EQ.				
		DN	EO-4A	SEOS R AND D	CDR	2995	11.0/ 7.4	SYNC.EQ.	TLG	9292	46.0	
13	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TUG	60532	59.7	.963
			NN/D-4	TRAFFIC MANAGEMENT	LCE-N	1422	12.5/10.3	SYNC.EQ.				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TUG	6953	48.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986												
FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
14	KSC	UP	NN/D-1	INTELSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	62312	57.5	.991
			NN/D-9	FOREIGN SYNC. METEOROL.	CDR-R	807	10.3/ 6.0	SYNC.EQ.				
		DN	NN/D-9	FOREIGN SYNC. METEOROL.	CDR	765	10.3/ 6.0	SYNC.EQ.	TLG	7718	58.3	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
15	KSC	UP	NN/D-28	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	62111	59.4	.988
			AST-1A	EXPLORER - LEO	CDR-N	649	12.2/ 2.6	297/ 297/ 28.5				
		DN	NN/D-10	GEOSYNC. OPERATIONAL MET	CDR	765	10.3/ 6.0	SYNC.EQ.	TLG	11208	58.4	
			AST-3	SOLAR PHYSICS MISSION	LCR	4146	13.1/11.6	270/ 270/ 28.5				
16	KSC	UP	NN/D-28	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	62197	52.2	.990
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	TLG	11536	40.0	
17	KSC	UP	LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5	TUG	50495	53.0	.963
			SP-1B	SPACE PROCESSING (P)	LCR-R	5171	5.0/14.0	160/ 160/ 28.5				
		DN	NN/D-3	DISASTER WARNING SAT.	LCR	2017	11.4/ 6.2	SYNC.EQ.	TUG	13553	51.4	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5				
18	VTR	UP	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR-R	2024	12.4/10.2	920/ 920/103.0	TUG	21726	57.8	.808
			EOP-8	VECTOR MAGNETOMETER SAT.	LCR-R	1209	10.4/ 6.2	216/ 216/ 90.0				
		DN							TUG	6297	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1996												
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
19	KSC	UP	AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5		28766	45.6	.604
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-3	SOLAR PHYSICS MISSION	LCR-R	4281	13.1/11.6	270/ 270/ 28.5				
			AST-7V	LSO REVISIT	CDR-N	3500	5.0/14.0	190/ 190/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	340/ 340/ 28.5				
		DN	AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5		14741	19.5	
			AST-7V	LSO REVISIT	CDR	3500	5.0/14.0	190/ 190/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	340/ 340/ 28.5				
20	KSC	UP	AST-9B	FOC, X RAY TELESCOPE	CDR-N	24136	53.0/14.0	270/ 270/ 28.5		31029	57.5	.628
		DN	AST-5	HEAO	CDR	17214	17.5/14.0	200/ 200/ 28.5		19716	22.0	
21	WTR	UP	EO-3C	EARTH OBS. SAT.	LCR-R	8630	36.0/10.2	300/ 300/ 99.0		25249	45.5	.924
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3A	EARTH OBS. SATELLITE	LCR	8213	36.0/10.2	300/ 300/ 99.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				
22	WTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R	8630	36.0/10.2	300/ 300/ 97.0		25249	45.5	.906
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	8213	36.0/10.2	300/ 300/ 97.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 97.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
23	KSC	UP	AST-5	HEAO	CDR-N	17434	17.5/14.0	200/ 200/ 28.5		40681	37.5	.687
			AST-10G	STELLAR ASTRONOMY (P)	LCR-R	13005	10.0/14.0	162/ 162/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 28.5				
		DN	AST-10G	STELLAR ASTRONOMY (P)	LCR	11373	10.0/14.0	162/ 162/ 28.5		19751	20.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 28.5				
24	VTR	UP	EOP-8	VECTOR MAGNETOMETER SAT.	LCR-R	1209	10.4/ 8.2	216/ 216/ 90.0		17781	35.8	.725
			EOP-8	VECTOR MAGNETOMETER SAT.	LCR-R	1209	10.4/ 8.2	216/ 216/ 90.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	216/ 216/ 90.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	216/ 216/ 90.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	216/ 216/ 90.0				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	216/ 216/ 90.0		12567	15.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	216/ 216/ 90.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	216/ 216/ 90.0				
25	KSC	UP	ST-1	LONG DURATION EXP. FAC.	CDR-R	10200	35.5/14.0	270/ 270/ 28.5		10200	35.5	.396
		DN								0	0	
26	KSC	UP	SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	270/ 270/ 28.5		5121	5.0	.343
		DN	ST-1	LONG DURATION EXP. FAC.	CDR	10200	35.5/14.0	270/ 270/ 28.5		14389	40.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	270/ 270/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
27	VTR	UP	NN/D-14	GLOBAL EARTH AND OCEAN	LCR-N	5062	13.7/12.7	200/ 200/ 98.0		21357	46.1	.816
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR-N	5062	13.7/12.7	200/ 200/ 98.0				
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR-N	5062	13.7/12.7	200/ 200/ 98.0				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	200/ 200/ 98.0				
		DN	NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	200/ 200/ 98.0		5239	5.0	
28	VTR	UP	AST10D30	STELLAR ASTRONOMY (P)	LCR-N	40200	54.0/14.0	120/ 120/ 90.0		40200	54.0	.969
		DN	AST10D30	STELLAR ASTRONOMY (P)	LCR	30570	54.0/14.0	120/ 120/ 90.0		30570	54.0	
29	KSC	UP	AST-10F	STELLAR ASTRONOMY (P)	LCR-R	55019	40.0/14.0	162/ 162/ 28.5		55019	40.0	.814
		DN	AST-10F	STELLAR ASTRONOMY (P)	LCR	31387	40.0/14.0	162/ 162/ 28.5		31387	40.0	
30	KSC	UP	AST-10H	STELLAR ASTRONOMY (P)	LCR-N	41512	52.0/14.0	162/ 162/ 28.5		41512	52.0	.659
		DN	AST-10H	STELLAR ASTRONOMY (P)	LCR	32000	52.0/14.0	162/ 162/ 28.5		32000	52.0	
31	KSC	UP	AST-10I	STELLAR ASTRONOMY (P)	LCR-N	29168	54.0/14.0	162/ 162/ 28.5		29168	54.0	.513
		DN	AST-10I	STELLAR ASTRONOMY (P)	LCR	19538	54.0/14.0	162/ 162/ 28.5		19538	54.0	
32	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-R	24771	50.0/14.0	210/ 210/ 28.5		30942	55.0	.589
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	210/ 210/ 28.5				
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039	50.0/14.0	210/ 210/ 28.5		28278	55.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	210/ 210/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD. FACTOR
33	KSC	UP	AST11C30	SOLAR PHYSICS (P)	LCR-N	41363	47.0/14.0	210/ 210/ 28.5		41363	47.0	.712
		DN	AST11C30	SOLAR PHYSICS (P)	LCR	31751	47.0/14.0	210/ 210/ 28.5		31751	47.0	
34	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		34848	40.0	.621
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		30912	40.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				
35	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		36083	42.0	.557
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		30690	42.0	
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	120/ 120/ 28.5				
36	KSC	UP	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR-N	39218	45.0/14.0	120/ 120/ 28.5		39218	45.0	.592
		DN	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR	30598	45.0/14.0	120/ 120/ 28.5		30598	45.0	
37	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 28.5		29002	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
38	KSC	UP	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 55.0		29002	60.0	.635
		DN	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 55.0		28238	60.0	
39	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
40	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
41	KSC	UP	LS-2A30	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A30	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
42	KSC	UP	LS-2A30	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A30	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
43	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
44	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/O (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
45	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	210/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
46	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	210/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
47	WTR	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	160/ 160/ 90.0		27002	60.0	.803
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	160/ 160/ 90.0		26138	60.0	
48	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	
49	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
50	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25638	60.0	
51	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5		31919	50.0	.548
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	162/ 162/ 28.5				
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		29350	50.0	
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	162/ 162/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	TRIP	CODE	NAME	PAYLOAD TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
52	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	
53D	WTR	UP										
		DN										
54D	WTR	UP							TUG			
		DN							TUG			
55D	WTR	UP										
		DN										
56D	WTR	UP							TUG			
		DN							TUG			
57D	KSC	UP							TUG			
		DN							TUG			
58D	WTR	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
59D	WTR	UP							TLG			
		DN							TLG			
60D	KSC	UP							TLG			
		DN							TLG			
61D	KSC	UP							TLG			
		DN							TLG			
62D	KSC	UP							TLG			
		DN							TLG			
63D	KSC	UP							TLG			
		DN							TLG			
64D	KSC	UP							TLG			
		DN							TLG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
65D	KSC	UP							TUG			
		DN							TUG			
66D	KSC	UP							TUG			
		DN							TUG			
67D	KSC	UP							TLG			
		DN							TLG			
68D	WTR	UP										
		DN										
69D	WTR	UP										
		DN										
70D	WTR	UP										
		DN										
71D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986													
FLT NO	LNCH SITE	TRIP	CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
72D	WTR	UP										
		DN										
73D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
1	KSC	UP							TLG	62732.	35.0	.998
		DN							TLG	6297.	35.0	
2	KSC	UP	AST-1B	EXPLORER - SYNC.	CDR-R	643.	12.2/ 2.6	19323/19323/ 28.5	TLG	57674.	58.2	.918
			EO-4B	SEOS OPERATIONAL	CDR-N	3085.	11.0/ 7.4	SYNC.EQ.				
		DN	NN/D-1	INTELSAT	CDR	9346.	12.2/ 8.3	SYNC.EQ.	TLG	11458.	57.4	
			EOP-9	MAGNETIC MONITOR SAT.	LCR	815.	10.2/ 5.8	108C/ 540/ 28.0				
3	KSC	UP	PL-13	MERCURY ORBITER	LCE-N	8498.	34.9/14.7	ESCAPE		8498.	34.9	.135
		DN								0.	.0	
4	KSC	UP	SP-1B	SPACE PROCESSING (P)	LCR-R	6171.	5.0/14.0	160/ 160/ 28.5	TUG	60126.	45.0	.957
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171.	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0	160/ 160/ 28.5	TUG	16775.	45.0	
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0	160/ 160/ 28.5				
5	KSC	UP	PL-13	MERCURY ORBITER	LCE-N	8498.	34.9/14.7	ESCAPE		8498.	34.9	.135
		DN								0.	.0	
6	KSC	UP	SP-1B	SPACE PROCESSING (P)	LCR-R	6171.	5.0/14.0	160/ 160/ 28.5	TLG	60126.	45.0	.957
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171.	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0	160/ 160/ 28.5	TLG	16775.	45.0	
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0	160/ 160/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/PP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
7	KSC	UP	AST-8V	LRO REVISIT	CDR-N	3000	5.0/14.0	38646/38646/ 28.5	TLG	62294	40.0	.991
		DN	AST-8V	LRO REVISIT	CDR	3000	5.0/14.0	38646/38646/ 28.5	TUG	9937	52.2	
			AST-1A	EXPLORER - LEO	CDR	640	12.2/ 2.6	297/ 297/ 28.5				
8	KSC	UP	PHY-1C	EXPLORER HIGH ALT.	LCE-N	1225	10.4/ 6.1	ESCAPE	TUG	58936	45.4	.938
		DN							TLG	6297	35.0	
9	KSC	UP	PHY-3B	ENVIRON. PERTUB. SAT.	CDR-N	9845	17.3/10.0	6900/ 6900/ 55.0	TLG	43853	52.3	.795
		DN							TUG	6297	35.0	
10	KSC	UP	LUN-3	AUTO. LUNAR ROVER	CDE-N	8700	24.0/10.0	ESCAPE	TUG	49750	59.0	.792
		DN							TLG	6297	35.0	
11	KSC	UP	EO-4B	SEOS OPERATIONAL	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	TLG	59287	56.9	.943
			EO-7	SYNC. METEOROLOGICAL	LCE-N	1077	10.9/ 7.2	SYNC.EQ.				
		DN	NN/D-10	GEOSYNC. OPERATIONAL MET	CDR	765	10.3/ 6.0	SYNC.EQ.	TLG	7718	58.3	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
12	WTR	UP	EO-6	TIROS N-P	CDR-N	1717	15.3/ 8.0	790/ 790/102.0	TLG	25452	60.0	.928
			EO-5C	SPECIAL PURPOSE SAT.	LCE-N	676	9.7/ 4.7	280/ 280/ 90.0				
		DN	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR	1899	12.4/10.2	920/ 920/103.0	TLG	9276	57.8	
			EOP-8	VECTOR MAGNETOMETER SAT.	LCR	1080	10.4/ 6.2	216/ 216/ 90.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	NN/D-28	U.S. DOMCOMSAT	CDR-N	4499	12.2/ 8.3	SYNC.EQ.	TLG	59367	59.4	.945
			NN/D-5	FOREIGN COMSAT	CDR-R	982	12.2/ 5.8	SYNC.EQ.				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TLG	6953	48.0	
14	KSC	UP	NN/D-28	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TUG	58162	57.5	.925
			NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR-R	807	10.3/ 6.0	SYNC.EQ.				
		DN							TUG	6297	35.0	
15	KSC	UP	AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5	TUG	60446	52.2	.962
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	NN/D-3	DISASTER WARNING SAT.	LCR	2017	11.4/ 8.2	SYNC.EQ.	TUG	13553	51.4	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5				
16	VTR	UP	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR-R	2024	12.4/10.2	920/ 920/103.0	TUG	21478	47.4	.799
		DN	EOP-8	VECTOR MAGNETOMETER SAT.	LCR	1080	10.4/ 6.2	216/ 216/ 90.0	TLG	8457	55.8	
			EOP-8	VECTOR MAGNETOMETER SAT.	LCR	1080	10.4/ 6.2	216/ 216/ 90.0				
17	KSC	UP	AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5		39749	58.0	.724
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-5	HEAO	CDR-R	17434	17.5/14.0	200/ 200/ 28.5				
			AST-5V	HEAO REVISIT	CDR-R	3500	5.0/14.0	200/ 200/ 28.5				
		DN	AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5		26716	32.0	
			AST-5V	HEAO REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5				
			AST-9A	FOC. X RAY TELESCOPE	CDR	17214	17.5/14.0	270/ 270/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987													
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
18	WTR	UP	EO-3A	EARTH OBS. SATELLITE	LCR-R	8630	36.0/10.2	300/ 300/ 99.0		25249	45.5	.924
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3B	EARTH OBS. SATELLITE	LCR	6213	36.0/10.2	300/ 300/ 99.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				
19	WTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R	9620	36.0/10.2	300/ 300/ 97.0		29940	50.5	.984
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	6213	36.0/10.2	300/ 300/ 97.0		17093	50.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 97.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	300/ 300/ 97.0				
20	KSC	UP	AST-7V	LSO REVISIT	CDR-R	3500	5.0/14.0	190/ 190/ 28.5		50257	48.5	.792
			PHY-5	COSMIC RAY LAB	CDR-N	46757	43.5/14.0	200/ 200/ 28.5				
		DN	AST-7V	LSO REVISIT	CDR	3500	5.0/14.0	190/ 190/ 28.5		3500	5.0	
21	KSC	UP	AST10D3C	STELLAR ASTRONOMY (P)	LCR-N	40200	54.0/14.0	162/ 162/ 28.5		40200	54.0	.644
		DN	AST10D3C	STELLAR ASTRONOMY (P)	LCR	30570	54.0/14.0	162/ 162/ 28.5		30570	54.0	
22	KSC	UP	AST-10J	STELLAR ASTRONOMY (P)	LCR-N	23519	45.0/14.0	162/ 162/ 28.5		33761	55.0	.570
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	162/ 162/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	162/ 162/ 28.5				
		DN	AST-10J	STELLAR ASTRONOMY (P)	LCR	21887	45.0/14.0	162/ 162/ 28.5		30265	55.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	162/ 162/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	162/ 162/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
23	KSC	UP	AST-10K7	STELLAR ASTRONOMY (P)	LCR-N	29637	48.0/14.0	162/ 162/ 28.5		29637	48.0	.522
		DN	AST-10K7	STELLAR ASTRONOMY (P)	LCR	28005	48.0/14.0	162/ 162/ 28.5		28005	48.0	
24	KSC	UP	AST-11B	SOLAR PHYSICS (P)	LCR-R	24771	50.0/14.0	210/ 210/ 28.5		35013	60.0	.639
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	210/ 210/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	210/ 210/ 28.5				
		DN	AST-11B	SOLAR PHYSICS (P)	LCR	23039	50.0/14.0	210/ 210/ 28.5		31417	60.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	210/ 210/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	210/ 210/ 28.5				
25	KSC	UP	AST-11D7	SOLAR PHYSICS (P)	LCR-N	23871	25.0/14.0	210/ 210/ 28.5		35163	35.0	.640
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	210/ 210/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	210/ 210/ 28.5				
		DN	AST-11D7	SOLAR PHYSICS (P)	LCR	22139	25.0/14.0	210/ 210/ 28.5		31562	35.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	210/ 210/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	210/ 210/ 28.5				
26	KSC	UP	AST11D30	SOLAR PHYSICS (P)	LCR-N	36784	32.0/14.0	210/ 210/ 28.5		36784	32.0	.657
		DN	AST11D30	SOLAR PHYSICS (P)	LCR	27054	32.0/14.0	210/ 210/ 28.5		27054	32.0	
27	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		33799	40.0	.507
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 55.0				
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		29857	40.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	120/ 120/ 55.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
28	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		20720	27.0	.379
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		18138	27.0	
29	KSC	UP	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR-R	39218	45.0/14.0	120/ 120/ 28.5		39219	45.0	.592
		DN	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR	30598	45.0/14.0	120/ 120/ 28.5		30598	45.0	
30	KSC	UP	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 55.0		29002	60.0	.635
		DN	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 55.0		28238	60.0	
31	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
32	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.869
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
33	KSC	UP	LS-2A30	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A30	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
34	KSC	UP	LS-2A30	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A30	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
35	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
36	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
37	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
38	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
39	KSC	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	180/ 180/ 55.0		27002	60.0	.583
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	180/ 180/ 55.0		26138	60.0	
40	WTR	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	160/ 160/ 90.0		25402	60.0	.776
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	160/ 160/ 90.0		24538	60.0	
41	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
42	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25638	60.0	
43	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5		26798	45.0	.483
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		25166	45.0	
44	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	
45	KSC	UP	NN/D-16D	GPL 2 (L+P)	LCR-R	26261	60.0/14.0	200/ 200/ 28.5		26261	60.0	.522
		DN	NN/D-16D	GPL 2 (L+P)	LCR	25497	60.0/14.0	200/ 200/ 28.5		25497	60.0	
46D	WTR	UP										
		DN										
47D	WTR	UP							TUG			
		DN							TUG			
48D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
49D	WTR	UP							TLG			
		DN							TUG			
50D	KSC	UP							TLG			
		DN							TLG			
51D	KSC	UP							TLG			
		DN							TLG			
52D	KSC	UP							TUG			
		DN							TUG			
53D	KSC	UP							TUG			
		DN							TUG			
54D	WTR	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
55D	KSC	UP							TUG			
		DN							TUG			
56D	KSC	UP							TUG			
		DN							TUG			
57D	KSC	UP							TUG			
		DN							TUG			
58D	KSC	UP							TUG			
		DN							TUG			
59D	KSC	UP							TUG			
		DN							TUG			
6CD	WTR	UP							TLG			
		DN							TLG			
61D	KSC	UP							TLG			
		DN							TLG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1987														
FLT NO	LNCH SITE	PAYLOAD								ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)			WEIGHT (LB)	LENGTH (FT)	
62D	WTR	UP											
		DN											
63D	WTR	UP											
		DN											
64D	WTR	UP											
		DN											
65D	WTR	UP											
		DN											
66D	WTR	UP											
		DN											
67D	WTR	UP											
		DN											
68D	WTR	UP											
		DN											

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

	1987												
		PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
FLT NO	LNCH SITE	TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
69D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP	PHY-4	HELIOCEN. AND INTERST.	CDE-N.	635.	10.5/10.0	ESCAPE	TLG P-II	57090.	54.0	.908
		DN							TLG	6297.	35.0	
2	KSC	UP							TLG	62732.	35.0	.998
		DN							TLG	6297.	35.0	
3	KSC	UP	PHY-1B	EXPLORER MEDIUM ALT.	CDR-N.	852.	12.8/ 5.0	20000/ 1000/ 28.5	TLG	47707.	60.0	.759
			NN/D-2B	U.S. DOMCOMSAT	CDR-N.	4498.	12.2/ 8.3	SYNC.EQ.				
		DN	NN/D-1	INTELSAT	CDR	4346.	12.2/ 8.3	SYNC.EQ.	TLG	11473.	59.4	
			NN/D-5	FOREIGN COMSAT	CDR	830.	12.2/ 5.8	SYNC.EQ.				
4	WTR	UP	PHY-1A	EXPLORER UPPER ATMOS.	CDR-N.	1587.	13.3/ 4.0	1900/ 140/ 90.0	TLG	22900.	58.0	.675
			EO-5D	SPECIAL PURPOSE SAT.	LCE-N.	676.	9.7/ 4.7	400/ 400/ 90.0				
		DN	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR	1899.	12.4/10.2	920/ 920/103.0	TLG	8196.	47.4	
5	KSC	UP	LUN-3	AUTO. LUNAR ROVER	CDF-N.	8700.	24.0/10.0	ESCAPE	TUG	49750.	59.0	.792
		DN							TLG	6297.	35.0	
6	KSC	UP	NN/D-2C	TRACKING AND DATA RELAY	CDR-N.	974.	17.9/ 8.3	SYNC.EQ.	TUG	50329.	52.9	.809
		DN	NN/D-9	FOREIGN SYNC. METEOROL.	CDR	765.	10.3/ 5.0	SYNC.EQ.	TLG	7702.	57.5	
			AST-1A	EXPLORER - LEO	CDR	840.	12.2/ 2.6	297/ 297/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
7	KSC	UP	NN/D-2C	TRACKING AND DATA RELAY	CDR-N	974	17.9/ 6.3	SYNC.EQ.	TLG	53610	57.9	.853
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TLG	12192	53.0	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5				
8	KSC	UP	NN/D-2C	TRACKING AND DATA RELAY	CDR-N	974	17.9/ 6.3	SYNC.EQ.	TLG	53610	57.9	.853
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TLG	12192	53.0	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5				
9	KSC	UP	NN/D-2B	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TUG	61019	59.7	.971
			NN/D-4	TRAFFIC MANAGEMENT	LCE-N	1422	12.5/10.3	SYNC.EQ.				
		DN	AST-3	SOLAR PHYSICS MISSION	LCR	4146	13.1/11.6	270/ 270/ 28.5	TUG	10443	48.1	
10	KSC	UP	NN/D-2B	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	58625	59.4	.933
			NN/D-5	FOREIGN COMSAT	CDR-R	982	12.2/ 5.8	SYNC.EQ.				
		DN							TLG	6297	35.0	
11	KSC	UP	NN/D-6	COMMUNICATIONS R AND D	LCE-N	3871	13.1/11.6	SYNC.EQ.	TLG	56502	58.4	.899
			NN/D-9	FOREIGN SYNC. METEOROL.	CDR-R	807	10.3/ 6.0	SYNC.EQ.				
		DN							TLG	6297	35.0	
12	WTR	UP	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR-R	2024	12.4/10.2	920/ 920/103.0	TLG	17236	52.4	.641
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/103.0				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/103.0	TLG	11536	40.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	NN/D-10	GEOSYNC. OPERATIONAL MET.	CDR-R	807	10.3/ 6.0	SYNC.EQ.	TUG	54422	56.3	.866
			NN/D-12	EARTH RESOURCES SAT.	CDR-N	3095	11.0/ 7.4	SYNC.EQ.				
		DN							TUG	6297	35.0	
14	KSC	UP	NN/D-12	EARTH RESOURCES SAT.	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	TUG	50452	57.0	.962
			NN/D-13	FOREIGN SEOS	CDR-N	3085	11.0/ 7.4	SYNC.EQ.				
		DN							TUG	6297	35.0	
15	KSC	UP	AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5		16148	55.8	.465
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-3	SOLAR PHYSICS MISSION	LCR-R	4281	13.1/11.6	270/ 270/ 28.5				
		DN	AST-6	LARGE SPACE TELESCOPE	CDR	20087	36.3/12.0	340/ 340/ 28.5		22589	40.8	
16	KSC	UP	AST-6	LARGE SPACE TELESCOPE	CDR-R	20151	36.3/12.0	340/ 340/ 28.5		38642	50.8	.712
			AST-7V	LSO REVISIT	CDR-R	3500	5.0/14.0	190/ 190/ 28.5				
			AST-98V	FOC. X RAY REVISIT	CDR-N	3500	5.0/14.0	270/ 270/ 28.5				
		DN	AST-7V	LSO REVISIT	CDR	3500	5.0/14.0	190/ 190/ 28.5		9502	14.5	
			AST-98V	FOC. X RAY REVISIT	CDR	3500	5.0/14.0	270/ 270/ 28.5				
17	WTR	UP	EO-3CV	EARTH OBS. SAT. REVISIT	LCR-R	3500	5.0/14.0	300/ 300/ 99.0		26514	19.5	.946
			SP-18	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
			SP-18	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3CV	EARTH OBS. SAT. REVISIT	LCR	3500	5.0/14.0	300/ 300/ 99.0		16480	19.5	
			SP-18	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				
			SP-18	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
18	WTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R	8630	36.0/10.2	300/ 300/ 97.0		25249	45.5	.906
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	6213	36.0/10.2	300/ 300/ 97.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 97.0				
19	KSC	UP	PHY-5V	COSMIC RAY LAB REVISIT	CDR-N	3500	5.0/14.0	200/ 200/ 28.5		34462	42.0	.618
			PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 28.5				
		DN	PHY-5V	COSMIC RAY LAB REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5		30016	42.0	
			PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 28.5				
20	KSC	UP	ST-1	LONG DURATION EXP. FAC.	CDR-R	10200	35.5/14.0	270/ 270/ 28.5		10200	35.5	.396
		DN								0	.0	
21	KSC	UP	SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	270/ 270/ 28.5		5121	5.0	.343
		DN	ST-1	LONG DURATION EXP. FAC.	CDR	10200	35.5/14.0	270/ 270/ 28.5		14389	40.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	270/ 270/ 28.5				
22	WTR	UP	NN/D-14	GLOBAL EARTH AND OCEAN	LCR-N	5062	13.7/12.7	200/ 200/ 98.0		25429	51.1	.891
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR-N	5062	13.7/12.7	200/ 200/ 98.0				
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR-N	5062	13.7/12.7	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 98.0				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 98.0		8378	10.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 98.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1998

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/PP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
23	KSC	UP	AST10D30	STELLAR ASTRONOMY (P)	LCR-R	40200	54.0/14.0	162/ 162/ 28.5		40200	54.0	.644
		DN	AST10D30	STELLAR ASTRONOMY (P)	LCR	30570	54.0/14.0	162/ 162/ 28.5		30570	54.0	
24	KSC	UP	AST10K30	STELLAR ASTRONOMY (P)	LCR-N	42702	55.0/14.0	162/ 162/ 28.5		42702	55.0	.673
		DN	AST10K30	STELLAR ASTRONOMY (P)	LCR	31190	55.0/14.0	162/ 162/ 28.5		31190	55.0	
25	KSC	UP	AST-10L	STELLAR ASTRONOMY (P)	LCR-N	41402	57.0/14.0	162/ 162/ 28.5		41402	57.0	.658
		DN	AST-10L	STELLAR ASTRONOMY (P)	LCR	31890	57.0/14.0	162/ 162/ 28.5		31890	57.0	
26	KSC	UP	AST-10M	STELLAR ASTRONOMY (P)	LCR-N	40146	37.0/14.0	162/ 162/ 55.0		40146	37.0	.735
		DN	AST-10M	STELLAR ASTRONOMY (P)	LCR	30634	37.0/14.0	162/ 162/ 55.0		30634	37.0	
27	KSC	UP	AST-11E7	SOLAR PHYSICS (P)	LCR-N	31004	45.0/14.0	210/ 210/ 28.5		31004	45.0	.590
		DN	AST-11E7	SOLAR PHYSICS (P)	LCR	29272	45.0/14.0	210/ 210/ 28.5		29272	45.0	
28	KSC	UP	AST11E30	SOLAR PHYSICS (P)	LCR-N	41612	52.0/14.0	210/ 210/ 28.5		41612	52.0	.715
		DN	AST11E30	SOLAR PHYSICS (P)	LCR	32000	52.0/14.0	210/ 210/ 28.5		32000	52.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
29	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		33798	40.0	.607
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 55.0				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		29862	40.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 55.0				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				
30	KSC	UP	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR-R	39218	45.0/14.0	120/ 120/ 28.5		39218	45.0	.592
		DN	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR	30598	45.0/14.0	120/ 120/ 28.5		30598	45.0	
31	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 28.5		29002	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	
32	KSC	UP	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 55.0		29002	60.0	.635
		DN	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 55.0		28238	60.0	
33	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
34	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTL WEIGHT (LB)	CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
35	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
36	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
37	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
38	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
39	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
40	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
41	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
42	WTR	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	160/ 160/ 90.0		27002	60.0	.803
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	160/ 160/ 90.0		26138	60.0	
43	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	
44	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
45	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25638	60.0	
46	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5		32969	50.0	.561
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	162/ 162/ 28.5				
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		30405	50.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	162/ 162/ 28.5				
47	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
48	KSC	UP	NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5		32826	30.0	.556
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
		DN	NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5		27214	30.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5				
49D	WTR	UP										
		DN										
50D	WTR	UP							TLG			
		DN							TLG			
51D	WTR	UP										
		DN										
52D	WTR	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1986

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
53D	KSC	UP							TUG			
		DN							TUG			
54D	KSC	UP							TUG			
		DN							TUG			
55D	KSC	UP							TUG			
		DN							TUG			
56D	KSC	UP							TUG			
		DN							TUG			
57D	WTR	UP							TUG			
		DN							TUG			
58D	KSC	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988													
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
59D	KSC	UP							TUG			
		DN							TUG			
60D	KSC	UP							TUG			
		DN							TUG			
61D	KSC	UP							TUG			
		DN							TUG			
62D	KSC	UP							TUG			
		DN							TUG			
63D	KSC	UP							TLG			
		DN							TLG			
64D	KSC	UP							TLG			
		DN							TLG			
65D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1988													
FLT NO	LNCH SITE	PAYLOAD								ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)			WEIGHT (LB)	LENGTH (FT)	
66D	WTR	UP											
		DN											
67D	WTR	UP											
		DN											
68D	WTR	UP											
		DN											
69D	WTR	UP											
		DN											
70D	WTR	UP											
		DN											

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP							TUG	62732	35.0	.998
		DN							TUG	6297	35.0	
2	KSC	UP	EO-4B	SEOS OPERATIONAL	CDR-N	3085	11.0/ 7.4	SYNC EQ	TUG	57636	57.0	.917
			EO-4B	SEOS OPERATIONAL	CDR-N	3085	11.0/ 7.4	SYNC EQ				
		DN	NN/D-1	INTELSAT	CDR	4346	12.2/ 8.3	SYNC EQ	TUG	14989	59.4	
			NN/D-1	INTELSAT	CDR	4346	12.2/ 8.3	SYNC EQ				
3	KSC	UP	AST-8V	LRO REVISIT	CDR-R	3000	5.0/14.0	38646/38646/ 28.5	TUG	62294	40.0	.991
		DN	AST-8V	LRO REVISIT	CDR	3000	5.0/14.0	38646/38646/ 28.5	TUG	9937	52.2	
			AST-1A	EXPLORER - LEO	CDR	640	12.2/ 2.6	297/ 297/ 28.5				
4	WTR	UP	SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 90.0	TUG	15187	40.0	.447
		DN	PHY-1A	EXPLORER UPPER ATMOS	CDR	1046	13.3/ 4.0	1900/ 140/ 90.0	TUG	12582	53.3	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 90.0				
5	WTR	UP	PHY-1A	EXPLORER UPPER ATMOS	CDR-R	1587	13.3/ 4.0	1900/ 140/ 90.0	TUG	27151	53.3	.800
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 90.0				
		DN	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR	1899	12.4/10.2	920/ 920/103.0	TUG	13435	52.4	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 90.0				
6	KSC	UP	EO-5E	SPECIAL PURPOSE SAT.	LCE-N	678	9.7/ 4.7	SYNC EQ	TUG	61228	56.9	.974
			NN/D-3	INTELSAT	CDR-R	4498	12.2/ 8.3	SYNC EQ				
		DN	PHY-1B	EXPLORER MEDIUM ALT.	CDR	848	12.8/ 5.0	2000/ 1000/ 28.5	TUG	7145	47.8	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	LOAD FACTOR
7	KSC	UP	PHY-1B	EXPLORER MEDIUM ALT.	CDR-R	852	12.8/ 5.0	20000/ 1000/ 28.5	TLG	62153	60.0	.989
			NN/D-1	INTELSAT	CDR-R	4498	12.2/ 8.3	SYNC.EQ.				
		DN	NN/D-5	FOREIGN COMSAT	CDR	830	12.2/ 5.8	SYNC.EQ.	TLG	7127	47.2	
8	KSC	UP	PL-14	VENUS LARGE LANDER	LCE-N	6129	25.0/14.7	ESCAPE	TUG	55155	60.0	.878
		DN							TLG	6297	35.0	
9	KSC	UP	PL-14	VENUS LARGE LANDER	LCE-N	6129	25.0/14.7	ESCAPE	TLG	55155	60.0	.878
		DN							TUG	6297	35.0	
10	KSC	UP	LUN-4	HALO SAT.	LCE-N	4633	19.1/14.7	ESCAPE	TUG	46097	59.1	.733
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	160/ 160/ 28.5	TUG	10486	40.0	
11	KSC	UP	NN/D-2B	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	62776	59.4	.999
			NN/D-5	FOREIGN COMSAT	CDR-R	982	12.2/ 5.8	SYNC.EQ.				
		DN	NN/D-10	GEOSYNC. OPERATIONAL MET	CDR	765	10.3/ 6.0	SYNC.EQ.	TLG	7718	58.3	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
12	KSC	UP	NN/D-2B	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	58903	57.5	.937
			NN/D-10	GEOSYNC. OPERATIONAL MET	CDR-R	807	10.3/ 6.0	SYNC.EQ.				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TLG	6953	48.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	NN/D-13	FOREIGN SEOS	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	TUG	60452	57.0	.962
			NN/D-13	FOREIGN SEOS	CDR-N	3085	11.0/ 7.4	SYNC.EQ.				
		DN							TUG	6297	35.0	
14	KSC	UP	AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5		18431	52.7	.490
			AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-5V	HEAO REVISIT	CDR-R	3500	5.0/14.0	200/ 200/ 28.5				
		DN	AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5		9502	14.5	
			AST-5V	HEAO REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5				
15	WTR	UP	EO-3B	EARTH OBS. SATELLITE	LCR-R	8630	36.0/10.2	300/ 300/ 99.0		25249	45.5	.924
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3C	EARTH OBS. SAT.	LCR	6213	36.0/10.2	300/ 300/ 99.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				
16	WTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R	8630	36.0/10.2	300/ 300/ 97.0		25249	45.5	.906
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	6213	36.0/10.2	300/ 300/ 97.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 97.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
17	KSC	UP	AST-5V	HEAO REVISIT	CDR-R	3500	5.0/14.0	200/ 200/ 28.5		33891	42.0	.612
			AST-7V	LSO REVISIT	CDR-R	3500	5.0/14.0	190/ 190/ 28.5				
			PHY-607	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	200/ 200/ 28.5				
		DN	AST-5V	HEAO REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5		30377	42.0	
			AST-7V	LSO REVISIT	CDR	3500	5.0/14.0	190/ 190/ 28.5				
			PHY-607	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	200/ 200/ 28.5				
18	KSC	UP	PHY-5V	COSMIC RAY LAB REVISIT	CDR-R	3500	5.0/14.0	200/ 200/ 28.5		30298	50.0	.570
			NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5				
		DN	PHY-5V	COSMIC RAY LAB REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5		28666	50.0	
			NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5				
19	WTR	UP	SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	200/ 200/ 98.0		11292	10.0	.646
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 98.0				
		DN	NN/D-14	GLOBAL EARTH AND OCEAN	LCR	4744	13.7/12.7	200/ 200/ 98.0		23660	51.1	
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR	4744	13.7/12.7	200/ 200/ 98.0				
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR	4744	13.7/12.7	200/ 200/ 98.0				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 98.0				
20	WTR	UP	AST10D30	STELLAR ASTRONOMY (P)	LCR-R	40200	54.0/14.0	120/ 120/ 90.0		40200	54.0	.969
		DN	AST10D30	STELLAR ASTRONOMY (P)	LCR	30570	54.0/14.0	120/ 120/ 90.0		30570	54.0	
21	KSC	UP	AST10K30	STELLAR ASTRONOMY (P)	LCR-R	42702	55.0/14.0	162/ 162/ 28.5		42702	55.0	.673
		DN	AST10K30	STELLAR ASTRONOMY (P)	LCR	31190	55.0/14.0	162/ 162/ 28.5		31190	55.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
22	KSC	UP	AST-10M	STELLAR ASTRONOMY (P)	LCR-R	40146	37.0/14.0	162/ 162/ 55.0		40146	37.0	.735
		DN	AST-10M	STELLAR ASTRONOMY (P)	LCR	30634	37.0/14.0	162/ 162/ 55.0		30634	37.0	
23	KSC	UP	AST-11E7	SOLAR PHYSICS (P)	LCR-R	31004	45.0/14.0	210/ 210/ 28.5		31004	45.0	.590
		DN	AST-11E7	SOLAR PHYSICS (P)	LCR	29272	45.0/14.0	210/ 210/ 28.5		29272	45.0	
24	KSC	UP	AST-11E7	SOLAR PHYSICS (P)	LCR-R	31004	45.0/14.0	210/ 210/ 28.5		31004	45.0	.590
		DN	AST-11E7	SOLAR PHYSICS (P)	LCR	29272	45.0/14.0	210/ 210/ 28.5		29272	45.0	
25	KSC	UP	AST11E30	SOLAR PHYSICS (P)	LCR-R	41612	52.0/14.0	210/ 210/ 28.5		41612	52.0	.715
		DN	AST11E30	SOLAR PHYSICS (P)	LCR	32000	52.0/14.0	210/ 210/ 28.5		32000	52.0	
26	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		32748	40.0	.593
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 55.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 55.0				
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		28812	40.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 55.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 55.0				
27	KSC	UP	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR-R	39218	45.0/14.0	120/ 120/ 28.5		39218	45.0	.592
		DN	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR	30598	45.0/14.0	120/ 120/ 28.5		30598	45.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
28	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 28.5		29002	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	
29	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
30	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
31	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3O	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
32	KSC	UP	LS-2A3O	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3O	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
33	KSC	UP	LS-2A3O	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3O	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
34	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
35	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
36	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
37	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
38	WTR	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	160/ 160/ 90.0		27002	60.0	.803
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	160/ 160/ 90.0		26138	60.0	
39	WTR	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	160/ 160/ 90.0		25402	60.0	.776
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	160/ 160/ 90.0		24538	60.0	
40	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
41	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25638	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
42	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	
43	KSC	UP	NN/D-16D	GPL 2 (L+P)	LCR-R	26261	60.0/14.0	200/ 200/ 28.5		26261	60.0	.522
		DN	NN/D-16D	GPL 2 (L+P)	LCR	25497	60.0/14.0	200/ 200/ 28.5		25497	60.0	
44	KSC	UP	SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5		32826	30.0	.556
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	160/ 160/ 28.5		27224	30.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	160/ 160/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5				
45D	WTR	UP										
		DN										
46D	WTR	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
47D	WTR	UP										
		DN										
48D	WTR	UP							TUG			
		DN							TLG			
49D	KSC	UP							TUG			
		DN							TUG			
50D	KSC	UP							TUG			
		DN							TUG			
51D	KSC	UP							TLG			
		DN							TLG			
52D	KSC	UP							TLG			
		DN							TLG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
53D	KSC	UP							TLG			
		DN							TLG			
54D	WTR	UP							TUG			
		DN							TUG			
55D	WTR	UP							TUG			
		DN							TUG			
56D	WTR	UP							TLG			
		DN							TLG			
57D	KSC	UP							TLG			
		DN							TLG			
58D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1989

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
59D	WTR	UP										
		DN										
60D	WTR	UP										
		DN										
61D	WTR	UP										
		DN										
62D	WTR	UP										
		DN										
63D	WTR	UP										
		DN										
64D	WTR	UP										
		DN										
65D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1	KSC	UP							TLG	43605	35.0	.694
		DN							TLG	6297	35.0	
2	KSC	UP	PL-8	MARS SAT. SAMPLE RETURN	LCE-N	16419	51.5/14.7	ESCAPE	B-II	26453	60.0	.421
		DN								0	0	
3	KSC	UP							TUG	62732	35.0	.998
		DN							TUG	6297	35.0	
4	KSC	UP	NN/D-1	INTELSAT	CDR-R	4498	12.2/ 8.3	SYNC.EQ.	TUG	62020	59.4	.987
			NN/D-1	INTELSAT	CDR-R	4498	12.2/ 8.3	SYNC.EQ.				
		DN	NN/D-1	INTELSAT	CDR	4346	12.2/ 8.3	SYNC.EQ.	TUG	14989	59.4	
			NN/D-1	INTELSAT	CDR	4346	12.2/ 8.3	SYNC.EQ.				
5	KSC	UP							TUG	62732	35.0	.998
		DN							TUG	6297	35.0	
6	KSC	UP	NN/D-1	INTELSAT	CDR-R	4498	12.2/ 8.3	SYNC.EQ.	TUG	53203	59.4	.847
			NN/D-28	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.				
		DN	NN/D-1	INTELSAT	CDR	4346	12.2/ 8.3	SYNC.EQ.	TUG	11491	60.0	
			PHY-18	EXPLORER MEDIUM ALT.	CDR	848	12.8/ 5.0	20000/ 1000/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
7	WTR	UP	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR-R	2024	12.4/10.2	920/ 920/103.0	TUG	21846	57.1	.643
			EO-5C	SPECIAL PURPOSE SAT.	LCE-N	676	9.7/ 4.7	280/ 280/ 90.0				
		DN	PHY-1A	EXPLORER UPPER ATMOS.	CDR	1046	13.3/ 4.0	1900/ 140/ 90.0	TUG	7343	48.3	
8	WTR	UP	PHY-1A	EXPLORER UPPER ATMOS.	CDR-R	1587	13.3/ 4.0	1900/ 140/ 90.0	TLG	22567	58.7	.665
			EOP-8	VECTOR MAGNETOMETER SAT.	LCR-R	1209	10.4/ 6.2	216/ 216/ 90.0				
		DN	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR	1999	12.4/10.2	920/ 920/103.0	TLG	8196	47.4	
9	KSC	UP	PHY-1B	EXPLORER MEDIUM ALT.	CDR-R	852	12.8/ 5.0	20000/ 1000/ 28.5	TUG	56069	58.0	.892
			EOP-9	MAGNETIC MONITOR SAT.	LCR-R	915	10.2/ 5.8	1080/ 540/ 28.0				
		DN	NN/D-5	FOREIGN COMSAT	CDR	830	12.2/ 5.8	SYNC.EQ.	TUG	7892	57.5	
			NN/D-9	FOREIGN SYNC. METEOROL.	CDR	765	10.3/ 6.0	SYNC.EQ.				
10	KSC	UP							TUG	42221	35.0	.765
		DN	PHY-3B	ENVIRON. PERTUB. SAT.	CDR	9290	17.3/10.0	6900/ 6900/ 55.0	TUG	15587	52.3	
11	KSC	UP	PHY-3B	ENVIRON. PERTUB. SAT.	CDR-R	9845	17.3/10.0	6900/ 6900/ 55.0	TLG	43853	52.3	.795
		DN							TUG	6297	35.0	
12	KSC	UP	LUN-5	LUNAR SAMPLE RETURN	CDE-N	11500	24.0/10.0	ESCAPE	TUG	55791	59.0	.888
		DN							TLG	6297	35.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
13	KSC	UP	NN/D-28	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TLG	62186	58.6	.989
			NN/D-3	DISASTER WARNING SAT.	LCR-R	2054	11.4/ 8.2	SYNC.EQ.				
		DN	AST-1A	EXPLORER - LEO	CDR	640	12.2/ 2.6	297/ 297/ 28.5	TLG	6937	47.2	
14	KSC	UP	NN/D-4	TRAFFIC MANAGEMENT	LCE-N	1422	12.5/10.3	SYNC.EQ.	TUG	51225	59.7	.815
			NN/D-5	FOREIGN COMSAT	CDR-R	982	12.2/ 5.8	SYNC.EQ.				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TUG	6953	48.0	
15	KSC	UP	NN/D-6	COMMUNICATIONS R AND D	LCE-N	3871	13.1/11.6	SYNC.EQ.	TLG	57243	58.4	.911
			NN/D-9	FOREIGN SYNC. METEOROL.	CDR-R	807	10.3/ 6.0	SYNC.EQ.				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TLG	6953	48.0	
16	KSC	UP	NN/D-12	EARTH RESOURCES SAT.	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	TUG	61681	57.0	.981
			NN/D-12	EARTH RESOURCES SAT.	CDR-N	3085	11.0/ 7.4	SYNC.EQ.				
		DN	AST-3	SOLAR PHYSICS MISSION	LCR	4146	13.1/11.6	270/ 270/ 28.5	TUG	10443	48.1	
17	KSC	UP	AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5		18431	52.7	.490
			AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-7V	LSO REVISIT	CDR-R	3500	5.0/14.0	190/ 190/ 28.5				
		DN	AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5		9502	14.5	
			AST-7V	LSO REVISIT	CDR	3500	5.0/14.0	190/ 190/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
18.	VTR	UP	EO-3AV	EARTH OBS. SAT. REVISIT	LCR-R.	3500.	5.0/14.0.	300/ 300/ 99.0.		26514.	19.5.	.946
			SP-1B	SPACE PROCESSING (P)	LCR-R.	6171.	5.0/14.0.	300/ 300/ 99.0.				
			SP-1B	SPACE PROCESSING (P)	LCR-R.	6171.	5.0/14.0.	300/ 300/ 99.0.				
		DN	EO-3AV	EARTH OBS. SAT. REVISIT	LCR	3500.	5.0/14.0.	300/ 300/ 99.0.		16480.	19.5.	
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0.	300/ 300/ 99.0.				
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0.	300/ 300/ 99.0.				
19.	VTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R.	8630.	36.0/10.2.	300/ 300/ 97.0.		25249.	45.5.	.906
			SP-1B	SPACE PROCESSING (P)	LCR-R.	6171.	5.0/14.0.	300/ 300/ 97.0.				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	6213.	36.0/10.2.	300/ 300/ 97.0.		13954.	45.5.	
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0.	300/ 300/ 97.0.				
20.	KSC	UP	AST-3	SOLAR PHYSICS MISSION	LCR-R.	4281.	13.1/11.6.	270/ 270/ 28.5.		7781.	18.1.	.369
			AST-9BV	FOC. X RAY REVISIT	CDR-R.	3500.	5.0/14.0.	270/ 270/ 28.5.				
		DN	AST-9BV	FOC. X RAY REVISIT	CDR	3500.	5.0/14.0.	270/ 270/ 28.5.		3500.	5.0.	
21.	KSC	UP	PHY-5V	COSMIC RAY LAB REVISIT	CDR-R.	3500.	5.0/14.0.	200/ 200/ 28.5.		15842.	15.0.	.404
			SP-1B	SPACE PROCESSING (P)	LCR-R.	6171.	5.0/14.0.	200/ 200/ 28.5.				
			SP-1B	SPACE PROCESSING (P)	LCR-R.	6171.	5.0/14.0.	200/ 200/ 28.5.				
		DN	AST-5	HEAO	CDR	17214.	17.5/14.0.	200/ 200/ 28.5.		31192.	32.5.	
			PHY-5V	COSMIC RAY LAB REVISIT	CDR	3500.	5.0/14.0.	200/ 200/ 28.5.				
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0.	200/ 200/ 28.5.				
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0.	200/ 200/ 28.5.				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
22	VTR	UP	EOP-8	VECTOR MAGNETOMETER SAT.	LCR-R	1209.	10.4/ 6.2	216/ 216/ 90.0		18831.	35.8	.743
			EOP-8	VECTOR MAGNETOMETER SAT.	LCR-R	1209.	10.4/ 6.2	216/ 216/ 90.0				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171.	5.0/14.0	216/ 216/ 90.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	216/ 216/ 90.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	216/ 216/ 90.0				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0	216/ 216/ 90.0		13617.	15.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	216/ 216/ 90.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	216/ 216/ 90.0				
23	KSC	UP	ST-1	LONG DURATION EXP. FAC.	CDR-R	10200.	35.5/14.0	270/ 270/ 28.5		10200.	35.5	.396
		DN								0.	.0	
24	KSC	UP	SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	270/ 270/ 28.5		5121.	5.0	.343
		DN	ST-1	LONG DURATION EXP. FAC.	CDR	10200.	35.5/14.0	270/ 270/ 28.5		14389.	40.5	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	270/ 270/ 28.5				
25	VTR	UP	NN/D-14	GLOBAL EARTH AND OCEAN	LCR-R	5062.	13.7/12.7	200/ 200/ 98.0		25428.	51.1	.891
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR-R	5062.	13.7/12.7	200/ 200/ 98.0				
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR-R	5062.	13.7/12.7	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121.	5.0/14.0	200/ 200/ 98.0				
		DN	SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	200/ 200/ 98.0		8378.	10.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189.	5.0/14.0	200/ 200/ 98.0				
26	VTR	UP	AST10D30	STELLAR ASTRONOMY (P)	LCR-R	40200.	54.0/14.0	120/ 120/ 90.0		40200.	54.0	.969
		DN	AST10D30	STELLAR ASTRONOMY (P)	LCR	30570.	54.0/14.0	120/ 120/ 90.0		30570.	54.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990													
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
27	KSC	UP	AST-10J	STELLAR ASTRONOMY (P)	LCR-R	23519	45.0/14.0	162/ 162/ 28.5		34811	55.0	.582
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	162/ 162/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	162/ 162/ 28.5				
		ON	AST-10J	STELLAR ASTRONOMY (P)	LCR	21887	45.0/14.0	162/ 162/ 28.5		31315	55.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	162/ 162/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	162/ 162/ 28.5				
28	KSC	UP	AST10K30	STELLAR ASTRONOMY (P)	LCR-R	42702	55.0/14.0	162/ 162/ 28.5		42702	55.0	.673
		ON	AST10K30	STELLAR ASTRONOMY (P)	LCR	31190	55.0/14.0	162/ 162/ 28.5		31190	55.0	
29	KSC	UP	AST-11E7	SOLAR PHYSICS (P)	LCR-R	31004	45.0/14.0	210/ 210/ 28.5		31004	45.0	.590
		ON	AST-11E7	SOLAR PHYSICS (P)	LCR	29272	45.0/14.0	210/ 210/ 28.5		29272	45.0	
30	KSC	UP	AST11E30	SOLAR PHYSICS (P)	LCR-R	41612	52.0/14.0	210/ 210/ 28.5		41612	52.0	.715
		ON	AST11E30	SOLAR PHYSICS (P)	LCR	32000	52.0/14.0	210/ 210/ 28.5		32000	52.0	
31	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		34848	40.0	.621
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 55.0				
		ON	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		30912	40.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 55.0				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
32	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		37133	42.0	.569
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		31745	42.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	120/ 120/ 28.5				
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	120/ 120/ 28.5				
33	KSC	UP	PHY-6D3D	HIGH ENERGY PHYSICS (P)	LCR-R	39218	45.0/14.0	120/ 120/ 28.5		39218	45.0	.592
		DN	PHY-6D3D	HIGH ENERGY PHYSICS (P)	LCR	30598	45.0/14.0	120/ 120/ 28.5		30598	45.0	
34	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 28.5		29002	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	
35	KSC	UP	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 55.0		29002	60.0	.635
		DN	PHY-7B	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 55.0		28238	60.0	
36	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
37	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
38	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
39	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
40	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
41	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
42	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
43	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
44	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
45.	KSC	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002.	60.0/14.0	180/ 180/ 55.0		27002.	60.0	.583
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138.	60.0/14.0	180/ 180/ 55.0		26138.	60.0	
46.	WTR	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402.	60.0/14.0	160/ 160/ 90.0		25402.	60.0	.776
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538.	60.0/14.0	160/ 160/ 90.0		24538.	60.0	
47.	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084.	60.0/14.0	180/ 180/ 28.5		26084.	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320.	60.0/14.0	180/ 180/ 28.5		25320.	60.0	
48.	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502.	60.0/14.0	180/ 180/ 90.0		26502.	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638.	60.0/14.0	180/ 180/ 90.0		25638.	60.0	
49.	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798.	45.0/14.0	162/ 162/ 28.5		31919.	50.0	.548
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121.	5.0/14.0	162/ 162/ 28.5				
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25156.	45.0/14.0	162/ 162/ 28.5		29350.	50.0	
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4194.	5.0/14.0	162/ 162/ 28.5				
50.	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482.	60.0/14.0	200/ 200/ 28.5		26482.	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718.	60.0/14.0	200/ 200/ 28.5		25718.	60.0	
51.	KSC	UP	NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121.	5.0/14.0	160/ 160/ 28.5		5121.	5.0	.230
		DN	NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184.	5.0/14.0	160/ 160/ 28.5		4184.	5.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
52	KSC	UP							XTUG	61473	35.0	.978
		DN								0	.0	
53	KSC	UP	PL-23	JUPITER SAT. ORB./LAND.	LCE-N	35795	48.3/14.7	ESCAPE	B-II	45829	56.8	.729
		DN								0	.0	
54D	WTR	UP										
		DN										
55D	WTR	UP							TUG			
		DN							TLG			
56D	WTR	UP										
		DN										
57D	WTR	UP							TLG			
		DN							TUG			
58D	KSC	UP							TLG			
		DN							TLG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
59D	KSC	UP							TLG			
		DN							TLG			
60D	KSC	UP							TUG			
		DN							TUG			
61D	KSC	UP							TLG			
		DN							TLG			
62D	KSC	UP							TLG			
		DN							TLG			
63D	WTR	UP							TLG			
		DN							TLG			
64D	KSC	UP							TUG			
		DN							TUG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990													
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
65D	KSC	UP							TUG			
		DN							TUG			
66D	KSC	UP							TUG			
		DN							TUG			
67D	KSC	UP							TUG			
		DN							TUG			
68D	KSC	UP							TUG			
		DN							TUG			
69D	KSC	UP							TUG			
		DN							TUG			
70D	KSC	UP							TUG			
		DN							TUG			
71D	KSC	UP							TLG			
		DN							TLG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1990

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
72D	WTR	UP										
		DN										
73D	WTR	UP										
		DN										
74D	WTR	UP										
		DN										
75D	WTR	UP										
		DN										
76D	WTR	UP										
		DN	DST-D									
77D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	SYNERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1.	KSC	UP							TLG	43605.	35.0.	.694
		DN							TLG	6297.	35.0.	
2.	KSC	UP	PL-8	MARS SAT. SAMPLE RETURN	LCE-N.	16419.	51.5/14.7.	ESCAPE	B-II	26453.	60.0.	.421
		DN								0.	0.	
3.	KSC	UP	PHY-2B	GRAVITY/RELATIVITY SAT.	LCE-N.	1372.	12.0/ 5.3.	ESCAPE	TUG B-II	38095.	55.5.	.606
		DN							TUG	6297.	35.0.	
4.	KSC	UP	AST-8V	LRO REVISIT	CDR-R.	3000.	5.0/14.0.	38646/38646/ 28.5.	TUG	62294.	40.0.	.991
		DN	AST-8V	LRO REVISIT	CDR	3000.	5.0/14.0.	38646/38646/ 28.5.	TLG	9937.	52.2.	
			AST-1A	EXPLORER - LEO	CDR	640.	12.2/ 2.6.	297/ 297/ 28.5.				
5.	WTR	UP	NN/D-8	ENVIRONMENTAL MON. SAT.	LCR-R.	2024.	12.4/10.2.	920/ 920/103.0.	TLG	22134.	57.1.	.652
			EG-5D	SPECIAL PURPOSE SAT.	LCE-N.	676.	9.7/ 4.7.	400/ 400/ 56.0.				
		DN	PHY-1A	EXPLORER UPPER ATMOS.	CDR	1046.	13.3/ 4.0.	1900/ 140/ 90.0.	TLG	7343.	48.3.	
6.	WTR	UP	PHY-1A	EXPLORER UPPER ATMOS.	CDR-R.	1587.	13.3/ 4.0.	1900/ 140/ 90.0.	TUG	23258.	53.3.	.685
			SP-1B	SPACE PROCESSING (P)	LCR-R.	6171.	5.0/14.0.	160/ 160/ 90.0.				
		DN	NN/D-14	GLOBAL EARTH AND OCEAN	LCR	4744.	13.7/12.7.	200/ 200/ 98.0.	TUG	16280.	53.7.	
			SP-1B	SPACE PROCESSING (P)	LCR	5239.	5.0/14.0.	160/ 160/ 90.0.				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
7	KSC	UP	EO-4B	SEOS OPERATIONAL	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	TUG	61551	56.3	.979
			NN/D-10	GEOSYNC. OPERATIONAL MET	CDR-R	807	10.3/ 6.0	SYNC.EQ.				
		DN	PHY-1B	EXPLORER MEDIUM ALT.	CDR	848	12.8/ 5.0	200DC/ 100D/ 28.5	TUG	7975	60.0	
			NN/D-5	FOREIGN COMSAT	CDR	830	12.2/ 5.8	SYNC.EQ.				
8	KSC	UP	PHY-1B	EXPLORER MEDIUM ALT.	CDR-R	852	12.8/ 5.0	200DC/ 100D/ 28.5	TUG	58989	58.8	.937
			EO-4B	SEOS OPERATIONAL	CDR-N	3085	11.0/ 7.4	SYNC.EQ.				
		DN	NN/D-10	GEOSYNC. OPERATIONAL MET	CDR	765	10.3/ 6.0	SYNC.EQ.	TUG	7718	58.3	
			LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5				
9	KSC	UP	LUN-5	LUNAR SAMPLE RETURN	CDE-N	11500	24.0/10.0	ESCAPE	TUG	55791	59.0	.888
		DN							TUG	6297	35.0	
10	KSC	UP	NN/D-1	INTELSAT	CDR-R	4498	12.2/ 8.3	SYNC.EQ.	TUG	59367	59.4	.945
			NN/D-5	FOREIGN COMSAT	CDR-R	982	12.2/ 5.8	SYNC.EQ.				
		DN	LS-1	LIFE SCIENCES MODULE	LCR	656	13.0/ 2.2	300/ 300/ 28.5	TUG	6953	48.0	
11	KSC	UP	NN/D-1	INTELSAT	CDR-R	4498	12.2/ 8.3	SYNC.EQ.	TUG	57428	59.4	.914
			AST-1A	EXPLORER - LEO	CDR-R	649	12.2/ 2.6	297/ 297/ 28.5				
		DN							TUG	6297	35.0	
12	KSC	UP	NN/D-2B	U.S. DOMCOMSAT	CDR-N	4498	12.2/ 8.3	SYNC.EQ.	TUG	62197	52.2	.990
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	160/ 160/ 28.5				
		DN	SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	160/ 160/ 28.5	TUG	11536	40.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

FLT NO	LNCH SITE	TRIP	CODE	NAME	TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
1991												
13	KSC	UP	NN/D-13	FOREIGN SEOS	CDR-N	3085	11.0/ 7.4	SYNC.EQ.	TLG	53688	59.0	.854
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
		DN							TLG	6297	35.0	
14	KSC	UP	AST-6V	LST REVISIT	CDR-R	3500	5.0/14.0	340/ 340/ 28.5		50299	57.5	.839
			AST-9A	FOC, X RAY TELESCOPE	CDR-R	17434	17.5/14.0	270/ 270/ 28.5				
			LS-1	LIFE SCIENCES MODULE	LCR-R	682	13.0/ 2.2	300/ 300/ 28.5				
			AST-5	HEAO	CDR-R	17434	17.5/14.0	200/ 200/ 28.5				
		DN	AST-6V	LST REVISIT	CDR	3500	5.0/14.0	340/ 340/ 28.5		6002	9.5	
15	WTR	UP	EO-3C	EARTH OBS. SAT.	LCR-R	8630	36.0/10.2	300/ 300/ 99.0		25249	45.5	.924
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 99.0				
		DN	EO-3A	EARTH OBS. SATELLITE	LCR	8213	36.0/10.2	300/ 300/ 99.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 99.0				
16	WTR	UP	NN/D-11	EARTH RESOURCES SAT.	LCR-R	9630	36.0/10.2	300/ 300/ 97.0		25249	45.5	.906
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	300/ 300/ 97.0				
		DN	NN/D-11	EARTH RESOURCES SAT.	LCR	8213	36.0/10.2	300/ 300/ 97.0		13954	45.5	
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	300/ 300/ 97.0				
17	KSC	UP	AST-7V	LSO REVISIT	CDR-R	3500	5.0/14.0	190/ 190/ 28.5		13171	15.0	.372
			PHY-5V	COSMIC RAY LAB REVISIT	CDR-R	3500	5.0/14.0	200/ 200/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	190/ 190/ 28.5				
		DN	AST-5	HEAO	CDR	17214	17.5/14.0	200/ 200/ 28.5		29453	32.5	
			AST-7V	LSO REVISIT	CDR	3500	5.0/14.0	190/ 190/ 28.5				
			PHY-5V	COSMIC RAY LAB REVISIT	CDR	3500	5.0/14.0	200/ 200/ 28.5				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	190/ 190/ 28.5				

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
18	KSC	UP				0	0.0			0	0.0	.288
		DN	AST-9B	FOC. X RAY TELESCOPE	CDR	23872	53.0/14.0	270/ 270/ 28.5		23872	53.0	
19	WTR	UP	SP-1B	SPACE PROCESSING (P)	LCR-R	6171	5.0/14.0	200/ 200/ 98.0		16413	15.0	.738
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	200/ 200/ 98.0				
		DN	NN/D-14	GLOBAL EARTH AND OCEAN	LCR	4744	13.7/12.7	200/ 200/ 98.0		23105	42.4	
			NN/D-14	GLOBAL EARTH AND OCEAN	LCR	4744	13.7/12.7	200/ 200/ 98.0				
			SP-1B	SPACE PROCESSING (P)	LCR	5239	5.0/14.0	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 98.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	200/ 200/ 98.0				
20	KSC	UP	AST10D30	STELLAR ASTRONOMY (P)	LCR-R	40200	54.0/14.0	162/ 162/ 28.5		40200	54.0	.644
		DN	AST10D30	STELLAR ASTRONOMY (P)	LCR	30570	54.0/14.0	162/ 162/ 28.5		30570	54.0	
21	KSC	UP	AST10K30	STELLAR ASTRONOMY (P)	LCR-R	42702	55.0/14.0	162/ 162/ 28.5		42702	55.0	.673
		DN	AST10K30	STELLAR ASTRONOMY (P)	LCR	31190	55.0/14.0	162/ 162/ 28.5		31190	55.0	
22	KSC	UP	AST-10L	STELLAR ASTRONOMY (P)	LCR-R	41402	57.0/14.0	162/ 162/ 28.5		41402	57.0	.658
		DN	AST-10L	STELLAR ASTRONOMY (P)	LCR	31890	57.0/14.0	162/ 162/ 28.5		31890	57.0	
23	KSC	UP	AST-11E7	SOLAR PHYSICS (P)	LCR-R	31004	45.0/14.0	210/ 210/ 28.5		31004	45.0	.590
		DN	AST-11E7	SOLAR PHYSICS (P)	LCR	29272	45.0/14.0	210/ 210/ 28.5		29272	45.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
24	KSC	UP	AST-11E7	SOLAR PHYSICS (P)	LCR-R	31004	45.0/14.0	210/ 210/ 28.5		31004	45.0	.590
		DN	AST-11E7	SOLAR PHYSICS (P)	LCR	29272	45.0/14.0	210/ 210/ 28.5		29272	45.0	
25	KSC	UP	AST11E30	SOLAR PHYSICS (P)	LCR-R	41612	52.0/14.0	210/ 210/ 28.5		41612	52.0	.715
		DN	AST11E30	SOLAR PHYSICS (P)	LCR	32000	52.0/14.0	210/ 210/ 28.5		32000	52.0	
26	KSC	UP	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR-R	22506	30.0/14.0	120/ 120/ 55.0		32748	40.0	.593
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 55.0				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 55.0				
		DN	PHY-6C	HIGH ENERGY PHYSICS (P)	LCR	20434	30.0/14.0	120/ 120/ 55.0		28812	40.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 55.0				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 55.0				
27	KSC	UP	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR-R	20720	27.0/14.0	120/ 120/ 28.5		37133	42.0	.569
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR-R	5121	5.0/14.0	120/ 120/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	120/ 120/ 28.5				
		DN	PHY-6D7	HIGH ENERGY PHYSICS (P)	LCR	18138	27.0/14.0	120/ 120/ 28.5		31755	42.0	
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 28.5				
			SP-1C	SPACE PROCESSING (P)	LCR	4189	5.0/14.0	120/ 120/ 28.5				
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	120/ 120/ 28.5				
28	KSC	UP	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR-R	39218	45.0/14.0	120/ 120/ 28.5		39218	45.0	.592
		DN	PHY-6D30	HIGH ENERGY PHYSICS (P)	LCR	30598	45.0/14.0	120/ 120/ 28.5		30598	45.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991													
FLT NO	LNCH SITE	PAYLOAD TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
29	KSC	UP	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	200/ 200/ 28.5		29302	60.0	.555
		DN	PHY-7A	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	200/ 200/ 28.5		28238	60.0	
30	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
31	WTR	UP	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR-R	29002	60.0/14.0	180/ 180/ 90.0		29002	60.0	.868
		DN	PHY-7C	ATMOS. SPACE PHY. (L+P)	LCR	28238	60.0/14.0	180/ 180/ 90.0		28238	60.0	
32	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
33	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
34	KSC	UP	LS-2A3D	LIFE SCIENCE (L)	LCR-R	37532	58.5/14.0	150/ 150/ 28.5		37532	58.5	.600
		DN	LS-2A3D	LIFE SCIENCE (L)	LCR	30185	58.5/14.0	150/ 150/ 28.5		30185	58.5	
35	KSC	UP	ST-2A	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2A	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
36	KSC	UP	ST-2B	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2B	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
37	KSC	UP	ST-2C	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2C	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
38	KSC	UP	ST-2D	SPACE TECHNOLOGY (L+P)	LCR-R	25296	60.0/14.0	200/ 200/ 55.0		25296	60.0	.584
		DN	ST-2D	SPACE TECHNOLOGY (L+P)	LCR	24532	60.0/14.0	200/ 200/ 55.0		24532	60.0	
39	WTR	UP	OA-1A	OFFICE OF APPLIC. (L+P)	LCR-R	27002	60.0/14.0	160/ 160/ 90.0		27002	60.0	.803
		DN	OA-1A	OFFICE OF APPLIC. (L+P)	LCR	26138	60.0/14.0	160/ 160/ 90.0		26138	60.0	
40	KSC	UP	OA-1B	OFFICE OF APPLIC. (L+P)	LCR-R	25402	60.0/14.0	180/ 180/ 55.0		25402	60.0	.561
		DN	OA-1B	OFFICE OF APPLIC. (L+P)	LCR	24538	60.0/14.0	180/ 180/ 55.0		24538	60.0	
41	KSC	UP	SP-1A	SPACE PROCESSING (L+P)	LCR-R	26084	60.0/14.0	180/ 180/ 28.5		26084	60.0	.499
		DN	SP-1A	SPACE PROCESSING (L+P)	LCR	25320	60.0/14.0	180/ 180/ 28.5		25320	60.0	
42	WTR	UP	NN/D-16A	EARTH OBSERVATION (L+P)	LCR-R	26502	60.0/14.0	180/ 180/ 90.0		26502	60.0	.824
		DN	NN/D-16A	EARTH OBSERVATION (L+P)	LCR	25638	60.0/14.0	180/ 180/ 90.0		25638	60.0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
43	KSC	UP	NN/D-16B	ASTRONOMY (P)	LCR-R	26798	45.0/14.0	162/ 162/ 28.5		32969	50.0	.561
			NN/D-15A	SPACE MANUFACTURING (P)	LCR-R	6171	5.0/14.0	162/ 162/ 28.5				
		DN	NN/D-16B	ASTRONOMY (P)	LCR	25166	45.0/14.0	162/ 162/ 28.5		30405	50.0	
			NN/D-15A	SPACE MANUFACTURING (P)	LCR	5239	5.0/14.0	162/ 162/ 28.5				
44	KSC	UP	NN/D-16C	GPL 1 (L+P)	LCR-R	26482	60.0/14.0	200/ 200/ 28.5		26482	60.0	.525
		DN	NN/D-16C	GPL 1 (L+P)	LCR	25718	60.0/14.0	200/ 200/ 28.5		25718	60.0	
45	KSC	UP	NN/D-16D	GPL 2 (L+P)	LCR-R	26261	60.0/14.0	200/ 200/ 28.5		26261	60.0	.522
		DN	NN/D-16D	GPL 2 (L+P)	LCR	25497	60.0/14.0	200/ 200/ 28.5		25497	60.0	
46	KSC	UP	NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5		10242	10.0	.290
			NN/D-15B	SPACE MANUFACTURING (P)	LCR-R	5121	5.0/14.0	160/ 160/ 28.5				
		DN	NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5		8368	10.0	
			NN/D-15B	SPACE MANUFACTURING (P)	LCR	4184	5.0/14.0	160/ 160/ 28.5				
47	KSC	UP							XTUG	61473	35.0	.978
		DN								0	0	
48	KSC	UP	PL-23	JUPITER SAT. ORB./LAND.	LCE-N	35795	48.3/14.7	ESCAPE	S-II	45829	56.8	.729
		DN								0	0	

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991

FLT NO	LNCH SITE	TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
49D	KSC	UP										
		DN										
50D	KSC	UP							TLC			
		DN							TUG			
51D	KSC	UP										
		DN										
52D	KSC	UP							TUG			
		DN							TLG			
53D	WTR	UP										
		DN										
54D	WTR	UP							TLC			
		DN							TUG			
55D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991													
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
56D	WTR	UP							TUG			
		DN							TLG			
57D	KSC	UP							TUG			
		DN							TUG			
58D	KSC	UP							TUG			
		DN							TUG			
59D	WTR	UP							TUG			
		DN							TUG			
60D	WTR	UP							TUG			
		DN							TUG			
61D	WTR	UP							TLG			
		DN							TLG			

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991													
FLT NO	LNCH SITE	PAYLOAD							ENERGY STAGE	SHUTTLE CARGO		SHUTTLE PERF LOAD FACTOR
		TRIP	CODE	NAME	TYPE	WEIGHT (LB)	L/D (FT/FT)	ORBIT HA/HP/INC (NMI/NMI/DEG)		WEIGHT (LB)	LENGTH (FT)	
62D	KSC	UP							TLG			
		DN							TLG			
63D	KSC	UP							TUG			
		DN							TUG			
64D	WTR	UP										
		DN										
65D	WTR	UP										
		DN										
66D	WTR	UP										
		DN										
67D	WTR	UP										
		DN										
68D	WTR	UP										
		DN										

TABLE 4. SHUTTLE CARGO MANIFEST (CON'T)

1991													
FLT NO	LNCH SITE	PAYLOAD TRIP	PAYLOAD CODE	PAYLOAD NAME	PAYLOAD TYPE	PAYLOAD WEIGHT (LB)	PAYLOAD L/D (FT/FT)	PAYLOAD ORBIT HA/HP/INC (NMI/NMI/DEG)	ENERGY STAGE	SHUTTLE CARGO WEIGHT (LB)	SHUTTLE CARGO LENGTH (FT)	SHUTTLE PERF LOAD FACTOR
69D	WTR	UP										
		DN										
70D	WTR	UP										
		DN										
71D	WTR	UP										
		DN										

EXPLANATION OF COLUMN HEADINGS FOR TABLE 5

FLIGHT NO.	Flight number, a number used purely for reference and does not indicate the launch sequence. A "D" following the flight number indicates a DoD flight.
LAUNCH SITE	Launch site; KSC, Kennedy Space Center; WTR, Western Test Range.
LAUNCH VEHICLE	Vehicle used to launch payload.
CODE	Payload code.
NAME	Payload name.
TYPE	Payload type. CDR — Current Design Reusable CDE — Current Design Expendable LCR — Low Cost Reusable LCE — Low Cost Expendable N — New payload R — Refurbished payload
WEIGHT	Payload launch weight in lb.
L/D	Payload length and diameter in feet.
ORBIT HA/HP/INC	Payload orbit: HA — Apogee in n. mi. HP — Perigee in n. mi. INC — Inclination in degrees
CARGO WEIGHT	Sum of all payload weights.
CARGO LENGTH	Sum of lengths of all payloads.

EXPENDABLE LAUNCH VEHICLE NOMENCLATURE

Vehicle	Description
Scout	4-stage solid
Delta 300	3 Caster II augmentation motors on standard long tank Thor with standard second stage
Delta 600	6 Caster II augmentation motors on standard long tank Thor with standard second stage
Delta 900	9 Caster II augmentation motors on standard long tank Thor with standard second stage
Delta 904	Delta 900 with TE 364-4 motor third stage
TIIIB/A	2-stage standard Core I and II, with Agena added
TIIIB/C	TIIIB with Centaur added
TIIIC	Two 5-segment, 120-in. solids, standard Core I and II, transtage
TIIID	TIIIC with transtage removed
TIIID/C	TIIID with Centaur added
TIIID/BII	TIIID with Burner II added
TIIID/C/BII	TIIID/C with Burner II added
TIIID7	Two 7-segment, 120-in. solids, stretched Core I and standard Core II
TIIID7/C	TIIID7 with Centaur added
TIIID7/C/BII	TIIID7 with Centaur and Burner II added
TIIIB/C/BII	TIIIB with Centaur and Burner II added

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP

Year 1980										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
1	KSC	TIIIB/A	AST-1B	Explorer – Sync.	CDR	650	12.2/2.6	19 323/19 323/28.5	650	12.2
2	KSC	TIIID/C	NN/D-1	INTELSAT	CDR	4 498	12.2/9.0	19 323/19 323/0	5 555	23.3
			NN/D-2A	U.S. DOMCOMSAT (Mission A)	LCE	1 057	11.1/7.6	19 323/19 323/0		
3	KSC	TIIID/C	NN/D-1	INTELSAT	CDR	4 498	12.2/9.0	19 323/19 323/0	5 920	24.7
			NN/D-4	Traffic Management	LCE	1 422	12.5/10.3	19 323/19 323/0		
4	KSC	TIIID/C	NN/D-1	INTELSAT	CDR	4 498	12.2/9.0	19 323/19 323/0	5 920	24.7
			NN/D-4	Traffic Management	LCE	1 422	12.5/10.3	19 323/19 323/0		
5	KSC	TIIIB/A	EO-5A	Special Purpose Satellite – Sync.	LCE	676	9.7/4.7	19 323/19 323/0	676	9.7
6	KSC	TIIIB/C/BII	PHY-1C	Explorer – High Altitude	LCE	1 226	10.4/6.1		1 226	10.4
7	KSC	TIIIC	PL-10	Inner Planetary Follow-On	LCE	2 772	11.5/8.4		2 772	11.5
8	KSC	TIIID/C/BII	PL-17	Pioneer Saturn Probe	CDE	1 146	10.5/10.0		1 146	10.5
9	KSC	TIIID	ST-1	Long Duration Exposure Facility	CDR	10 200	35.5/14.0	270/270/28.5	10 200	35.5
10	KSC	Scout	EOP-6B	MINI LAGEOS – 55	CDE	225	1.6/1.6	350/350/55	225	1.6
11	KSC	Scout	EOP-6B	MINI LAGEOS – 55	CDE	225	1.6/1.6	350/350/55	225	1.6
12	WTR	Delta 300	EO-5B	Special Purpose Satellite – Polar	LCE	676	9.7/4.7	3000/300/90	676	9.7

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP (Continued)

Year 1980 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
13	WTR	Delta 900	PHY-2A	Gravity/Relativity Satellite – Mission A	LCE	2 514	13.6/12.5	500/500/90	2 514	13.6
14	WTR	Delta 904	NN/D-8	Environmental Monitoring Satellite	LCR	2 025	12.4/10.2	920/920/103	2 025	12.4
15	WTR	TIIID	EOP-5	Gravity Gradiometer	LCE	10 236	30.2/14.7	108/108/90	10 236	30.2
16	WTR	TIIIB/C	NN/D-11	Earth Resources Satellite – LEO	LCR	8 630	36.0/10.2	500/500/97	8 630	36.0
17	WTR	Scout	EOP-6C	MINI LAGEOS – 90	CDE	225	1.6/1.6	350/350/90	225	1.6
18	WTR	Scout	EOP-6C	MINI LAGEOS – 90	CDE	225	1.6/1.6	350/350/90	225	1.6
19_D	KSC									
20_D	KSC									
21_D	KSC									
22_D	KSC									
23_D	WTR									
24_D	WTR									

Notes: Subscript D = DoD flight. Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP (Continued)

Year 1980 (Continued)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
25_D	WTR									
26_D	WTR									
27_D	WTR									
28_D	KSC									
29_D	KSC									
30_D	KSC									
31_D	KSC									
32_D	KSC									
33_D	KSC									
34_D	WTR									
35_D	WTR									
36_D	WTR									
37_D	WTR									

Notes: Subscript D = DoD flight

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP (Continued)

Year 1980 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
38_D	WTR									
39_D	WTR									
40_D	WTR									
41_D	WTR									

Notes: Subscript *D* = DoD flight

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP (Continued)

Year 1981										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
1	KSC	TIIID/C	PL-26	Comet Encke Rendezvous	LCE	4 978	19.9/14.7		4 978	19.9
2	KSC	TIIID/C	PL-26	Comet Encke Rendezvous	LCE	4 978	19.9/14.7		4 978	19.9
3	WTR	Delta 600	PHY-1A	Explorer – Upper Atmosphere	CDR	1 588	13.3/4.0	1900/140/90	1 588	13.3
4	WTR	TIIIC	EO-3C	Earth Observation Satellite – Mission C	LCR	8 630	36.0/10.2	500/500/99	8 630	36.0
5	WTR	Delta 300	EO-5C	Special Purpose Satellite – Polar	LCE	676	9.7/4.7	280/280/90	1 352	19.4
			EO-5C	Special Purpose Satellite – Polar	LCE	676	9.7/4.7	280/280/90		
6	WTR	Delta 300	EOP-8	Vector Magnetometer Satellite	LCR	1 209	10.4/6.2	216/216/90	2 418	20.8
			EOP-8	Vector Magnetometer Satellite	LCR	1 209	10.4/6.2	216/216/90		
7	WTR	Delta 300	EOP-8	Vector Magnetometer Satellite	LCR	1 209	10.4/6.2	216/216/90	1 209	10.4
8	WTR	Delta 904	NN/D-8	Environmental Monitoring Satellite	LCR	2 025	12.4/10.2	920/920/103	2 025	12.4
9	WTR	TIIIB/C	NN/D-11	Earth Resources Satellite – LEO	LCR	8 630	36.0/10.2	500/500/97	8 630	36.0
10_D	WTR									
11_D	KSC									
12_D	KSC									

Notes: Subscript D = DoD flight.

Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP (Continued)

Year 1981 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
13_D	WTR									
14_D	WTR									
15_D	WTR									
16_D	WTR									
17_D	WTR									
18_D	WTR									
19_D	WTR									
20_D	WTR									
21_D	WTR									
22_D	WTR									

Notes: Subscript D = DoD flight. Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP (Continued)

Year 1982										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
1	WTR	Delta 300	EO-5D	Special Purpose Satellite – Polar	LCE	676	9.7/4.7	400/400/90	676	9.7
2	WTR	Delta 900	EO-6	Tiros N-P	LCE	1 920	12.3/10.0	790/790/102	1 920	12.3
3	WTR	Delta 904	EOP-3	SEASAT B	LCE	3 030	18.3/14.7	325/325/90	3 030	18.3
4	WTR	TIIIC	EOP-4	GEOPAUSE	CDE	2 231	10.0/6.5	16 200/16 200/90	2 231	10.0
5	WTR	Delta 904	NN/D-8	Environmental Monitoring Satellite	LCR	2 025	12.4/10.2	920/920/103	2 025	12.4
6	WTR	TIIIB/C	NN/D-11	Earth Resources Satellite – LEO	LCR	8 630	36.0/10.2	500/500/97	8 630	36.0
7_D	WTR									
8_D	WTR									
9_D	WTR									
10_D	WTR									
11_D	WTR									
12_D	WTR									
13_D	WTR									
14_D	WTR									

Notes: Subscript D = DoD flight. Flight numbers do not represent a priority or a sequence of flights.

TABLE 5. EXPENDABLE LAUNCH VEHICLES ASSIGNED DUE TO WTR AND SHUTTLE BUILDUP (Concluded)

Year 1982 (Concluded)										
Flight No.	Launch Site	Launch Vehicle	Payload						Cargo	
			Code	Name	Type	Weight (lb)	L/D (ft/ft)	Orbit HA/HP/INC (n.mi./n.mi./deg)	Weight (lb)	Length (ft)
15_D	WTR									
16_D	WTR									
17_D	WTR									

Notes: Subscript D = DoD flight. Flight numbers do not represent a priority or a sequence of flights.

TABLE 6. SHUTTLE AND TUG TRAFFIC SUMMARY

PROGRAM	YEAR												
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	TOTAL
NASA & NON–NASA													
SHUTTLE FLIGHTS													
KSC	14	32	27	34	35	42	42	37	39	33	42	39	416
WTR			1	7	10	9	10	8	9	11	11	9	85
TOTAL	14	32	28	41	45	51	52	45	48	44	53	48	501
TUG FLIGHTS													
KSC		12	5	13	14	15	17	12	12	11	14	11	136
WTR					4	1	1	2	2	2	2	2	16
TOTAL		12	5	13	18	16	18	14	14	13	16	13	152
DOD													
SHUTTLE FLIGHTS													
KSC		2	9	11	15	6	9	10	11	6	13	8	100
WTR				16	13	17	12	14	11	15	11	15	124
TOTAL		2	9	27	28	23	21	24	22	21	24	23	224
TUG FLIGHTS													
KSC		2	9	11	15	6	9	10	11	6	13	6	98
WTR				6	4	5	4	4	3	5	3	5	39
TOTAL		2	9	17	19	11	13	14	14	11	16	11	137
SUBTOTAL													
SHUTTLE FLIGHTS	14	34	37	68	73	74	73	69	70	65	77	71	725
TUG FLIGHTS		14	14	30	37	27	31	28	28	24	32	24	289
ABORT FLIGHTS													
SHUTTLE		2	3	5	6	6	6	6	6	5	6	6	57
TUG		1	1	3	4	2	3	2	2	2	3	2	25
TOTAL													
SHUTTLE FLIGHTS	14	36	40	73	79	80	79	75	76	70	83	77	782
TUG FLIGHTS		15	15	33	41	29	34	30	30	26	35	26	314

TABLE 7. EXPENDABLE LAUNCH VEHICLE TRAFFIC SUMMARY
ASSIGNED DUE TO WTR AVAILABILITY & SHUTTLE BUILDUP RATE

EXPENDABLE LAUNCH VEHICLES	LAUNCH SITE	1980		1981		1982		TOTAL	
		NASA & NON-NASA	DOD	NASA & NON-NASA	DOD	NASA & NON-NASA	DOD	NASA & NON-NASA	DOD
SCOUT	KSC WTR	2 2						2 2	
DELTA 300	KSC WTR	1		3		1		5	
DELTA 600	KSC WTR	0		1		0		1	
DELTA 900	KSC WTR	1		0		1		2	
DELTA 904	KSC WTR	1		1		2		4	
TIIIB/C	KSC WTR	1		1		1		3	
TIIID7	KSC WTR	0		0		0		0	
TIIID/C/BII	KSC WTR	1		0		0		1	
TIIIB/A	KSC WTR	2		0		0		2	
TIIIB/C/BII	KSC WTR								
TIIID	KSC WTR	1 1						1 1	
TIIID/BII	KSC WTR								
TIIID/C	KSC WTR	3		2		0		5	
TIIID7/C	KSC WTR	0		0		0		0	
TIIID7/C/BII	KSC WTR	1		0		0		1	
TIIIC	KSC WTR	1		1		1		1 2	
SUB-TOTAL/AGENCY	KSC WTR	11 7	10 13	2 7	2 11	0 6	0 11	13 20	12 35
SUB-TOTAL/YEAR ABORT FLIGHTS		41 4		22 2		17 2		80 8	
TOTAL		45		24		19		88	

TABLE 8. SPACELAB FLIGHT SUMMARY

	Year												
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	Total
NASA Spacelabs													
• Lab	2	2	2	2	2	2	2	2	3	3	3	3	28
• Pallet	2	4	6	7	8	11	10	9	9	9	8	9	92
• Lab and Pallet	5	8	8	8	10	10	11	10	11	10	11	10	112
	9	14	16	17	20	23	23	21	23	22	22	22	232
Foreign Spacelabs													
• Lab	0	0	0	0	0	0	0	0	0	0	0	0	
• Pallet	0	1	1	1	1	1	1	1	1	1	1	1	11
• Lab and Pallet	2	2	2	3	2	3	2	3	2	3	2	3	29
	2	3	3	4	3	4	3	4	3	4	3	4	40
Non-NASA-U.S. Domestic													
• Pallet									1	1	1	1	4
Total	11	17	19	21	23	27	26	25	27	27	26	27	276
Flight Sharing with Automated Payloads	0	4	5	10	7	8	9	5	7	6	6	6	73

TABLE 9. SORTIE MISSION MODEL

CODE	PAYLOAD	CONFIG.	UP WEIGHT	DOWN WEIGHT	TOTAL LENGTH	ORBITAL INCL.	ORBITAL ALT.	LAUNCH SCHEDULE 80	81	82	83	84	85	86	87	88	89	90	91	80–91 EQUIV. FLTS.	80–91 TOTAL
AST 10a	STELLAR	PALLET	31 857	30 225	50	28.5	162	0	1	1	1									3	3
10b		PALLET	28 526	26 894	45	28.5	162			1	1									2	2
10c		PALLET	30 811	29 179	30	28.5	162					1	1							2	2
10d7		PALLET	27 287	25 655	47	28.5	162					1								1	1
10d7		PALLET	27 287	25 655	47	90	120						1							1	1
10d30		PALLET	40 200	30 570	54	28.5	162								1	1			1	3	3
10d30		PALLET	40 200	30 570	54	90	120							1			1	1		3	3
10e		PALLET	25 460	23 828	40	28.5	162					1	1							2	2
10f		PALLET	55 019	31 387	40	28.5	162						1	1						2	2
10g		PALLET	13 005	11 373	10	28.5	162						H	H						1	2
10h		PALLET	41 512	32 000	52	28.5	162							1						1	1
10i		PALLET	29 168	19 538	54	28.5	162							1						1	1
10j		PALLET	23 519	21 887	45	28.5	162								1			1		2	2
10k7		PALLET	29 637	28 005	48	28.5	162								1					1	1
10k30		PALLET	42 702	31 190	55	28.5	162									1	1	1	1	4	4
10l		PALLET	41 402	31 690	57	28.5	162									1			1	2	2
10m		PALLET	40 146	30 634	37	55	162									1	1			2	2
								0	1	2	2	3	4½	4½	3	4	3	3	3	33	34
AST 11a	SOLAR	PALLET	21 055	19 323	25	28.5	210	1	1											2	2
11b	PHYSICS	PALLET	24 771	23 039	50	28.5	210			1	2	2	1	1	1					8	8
11c7		PALLET	30 298	28 566	40	28.5	210						2							2	2
11c30		PALLET	41 363	31 751	47	28.5	210							1						1	1
11d7		PALLET	23 871	22 139	25	28.5	210								1					1	1
11d30		PALLET	36 784	27 054	32	28.5	210								1					1	1
11e7		PALLET	31 004	29 272	45	28.5	210									1	2	1	2	6	6
11e30		PALLET	41 612	32 000	52	28.5	210									1	1	1	1	4	4
			31 227	28 242	55			1	1	1	2	2	3	2	3	2	3	2	3	25	25
PHY 6a	HIGH	PALLET	15 936	13 804	30	28.5	120 &	H		H	H	H	H							2.5	5
6b	ENERGY	PALLET	20 898	18 316	25	28.5	120	H		H	H	H	H							2.5	
6c		PALLET	22 506	20 434	30	55	120		H	H	H	H	H	H	H	H	H	H	H	5.5	11
6d		PALLET	20 720	18 138	27	28.5	120		H	H	H	H	H	H	H	H	H	H	H	5.5	11
6e30		PALLET	39 218	30 598	45	28.5	120							1	1	1	1	1	1	6	6
								1	1	2	2	2	2	2	2	2	2	2	2	22	33
PHY 7a	ATMOS.	L + P	29 002	28 238	60	28.5	200	0	1	1	0	0	1	1	0	1	1	1	1	8	8
7b	SPACE	L + P	29 002	28 238	60	55	200	0	0	0	0	1	0	1	1	1	0	1	0	5	5
7c	PHYSICS	L + P	29 002	28 238	60	90	180	0	0	0	1	2	2	2	2	2	2	2	2	17	17
								0	1	1	1	3	3	4	3	4	3	4	3	30	30
TOTAL								2	5	7	8	11	14	14	12	13	12	12	12	–	122
EQUIV. FLTS.								2	4	6	7	10	12½	12½	11	12	11	11	11	110	–

NOTE: L + P = LAB PLUS PALLET
H = HALF PALLET

TABLE 9. SORTIE MISSION MODEL (Concluded)

CODE	PAYLOAD	CONFIG.	UP WEIGHT	DOWN WEIGHT	TOTAL LENGTH	ORBITAL		LAUNCH SCHEDULE												80–91	
						INCL.	ALT.	80	81	82	83	84	85	86	87	88	89	90	91	EQUIV. FLTS.	TOTAL
LS 2a7	LIFE	LAB	37 532	30 185	58.5	28.5	150	2	2	2										6	6
2a30	SCIENCE	LAB	37 532	30 185	58.5	28.5	150				2	2	2	2	2	3	3	3	3	22	22
								2	2	2	2	2	2	2	2	3	3	3	3	28	28
ST 2a	SPACE	L + P	25 296	24 532	60	55	200	1	1	1	1	1	1	1	1	1	1	1	1	12	12
2b	TECH.	L + P	25 296	24 532	60	55	200	1	1	1	1	1	1	1	1	1	1	1	1	12	12
2c		L + P	25 296	24 532	60	55	200		1	1	1	1	1	1	1	1	1	1	1	11	11
2d		L + P	25 296	24 532	60	55	200		1	1	1	1	1	1	1	1	1	1	1	11	11
								2	4	4	4	4	4	4	4	4	4	4	4	46	46
OA 1a	OFFICE	L + P	27 002	26 138	60	55	180	1	1	1	1		1		1			1		7	7
1a	OF	L + P	27 002	26 138	60	90	160					1		1		1	1		1	5	5
1b	APPLIC.	L + P	25 402	24 538	60	55	180	1	1	1	1	1		1		1			1	8	8
1b		L + P	25 402	24 538	60	90	160						1		1		1	1		4	4
SP 1a	SPACE	L + P	26 084	25 320	60	28.5	180	1	1	1	1	1	1	1	1	1	1	1	1	12	12
1b	PROCESS	PALLET	6 171	5 239	5	ANY	ANY		2	6	6	6	6	6	6	6	6	6	6	15¼	62
1c		PALLET	5 121	4 189	5	ANY	ANY		2	6	6	6	6	6	6	6	6	6	6	15¼	62
								3	4	6	6	6	6	6	6	6	6	6	6	67	160
	NON/NASA																				
	NON/DOD																				
	SPACE																				
NN D15a	MFG.	PALLET	6 171	5 239	5	ANY	ANY						2	4	2	4	2	4	2	5	20
D15b		PALLET	5 121	4 184	5	ANY	ANY						2	4	2	4	2	4	2	5	20
	FOREIGN																				
NN D16a73	E. O.	L + P	26 502	25 638	60	28.5	180	1		1										3	3
D16a79	E.O.	L + P	26 502	25 638	60	90	180					1		1		1		1		9	9
D16b	ASTM	PALLET	26 798	25 166	45	28.5	162		1	1	1	1	1	1	1	1	1	1	1	11	11
D16c	GPL 1	L + P	26 482	25 718	60	28.5	200	1	1	1	1	1	1	1	1	1	1	1	1	12	12
D16d	GPL 2	L + P	26 261	25 497	60	28.5	200				1		1		1		1		1	5	5
								2	3	3	4	3	5	5	5	5	5	5	5	50	80
TOTAL SHEET #1								2	5	7	8	11	14	14	12	13	12	12	12	–	122
TOTAL SHEET #2								9	16	24	25	24	29	32	29	33	30	33	30	–	314
TOTAL								11	21	31	33	35	43	46	41	46	42	45	42	–	436
EQUIV. FLTS. SHEET #1								2	4	6	7	10	12½	12½	11	12	11	11	11	110	–
EQUIV. FLTS. SHEET #2								9	13	15	16	15	17	17	17	18	18	18	18	191	–
TOTAL								11	17	21	23	25	29½	29½	28	30	29	29	29	301	–

NOTE: L + P = LAB PLUS PALLET

C-37

APPENDIX

TRANSPORTATION SECTION

Space Shuttle System Description and General Capabilities

This section describes the Space Shuttle system as it relates to payloads.

The Shuttle flight system is composed of the Orbiter, an external tank containing the ascent propellants to be used by the Orbiter main engines, and two solid rocket boosters (SRB's). The Shuttle flight system is shown in Figure A-1.

The SRB's and the Orbiter main engines fire in parallel, providing thrust for lift-off. The Orbiter main engines continue firing until the vehicle reaches the desired suborbital conditions, where the external tank is jettisoned. The orbital maneuvering subsystem (OMS) is immediately fired to place the Orbiter into the desired final orbit. The Orbiter delivers and retrieves payloads, conducts orbital operations, and returns to a land base in a manner similar to that of high-performance aircraft.

The Orbiter shown in Figure A-1 is a reusable vehicle designed to operate in orbit for missions of up to 7-day duration. However, the Orbiter is being designed so as not to preclude missions of durations up to 30 days from being accomplished. The crew and other personnel will be accommodated in a shirt-sleeve environment in a two-level pressurized cabin with an airlock that provides access to the payload bay and permits extravehicular activity (EVA). The cabin is being designed for a basic crew of four with expendables provisioning for 28 man-days.

The Orbiter crew consists of the commander and pilot. Additional crewmen required to conduct Orbiter/payload operations are a mission specialist and a payload specialist.

BASELINE PERFORMANCE

The Space Shuttle system provides a general capability for the transportation of a wide variety of payloads to and from low earth orbit altitudes

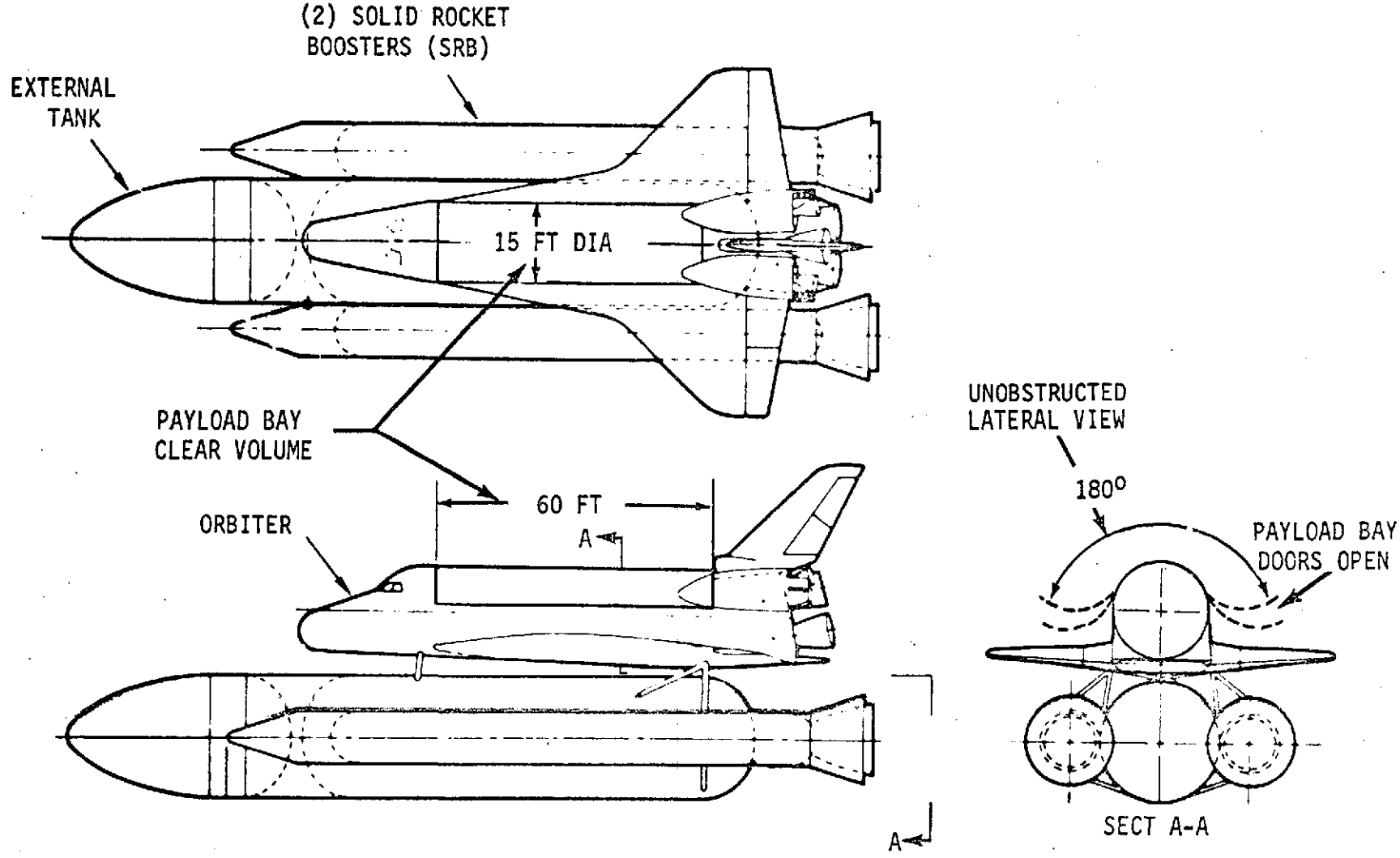

Figure A-1. Space Shuttle flight system.

at various inclinations. To accomplish this goal, reference missions have been selected for design purposes that are representative of the wide spectrum of anticipated missions.

The launch technique uses a suborbital external tank separation. For missions launched from the Kennedy Space Center (KSC), the main engine cutoff (MECO) occurs on a suborbital trajectory targeted so that the external tank will impact in the Indian Ocean. Immediately after MECO the Orbiter separates, and the OMS is used to place the Orbiter into the desired final orbit. The OMS ΔV required for the launch phase, that is to raise the Orbiter from the MECO conditions to a 50 by 100 nautical mile (or its equivalent) orbit, is 155 fps for a KSC launch. Missions launched from Vandenberg Air Force Base (VAFB) into a similar suborbital trajectory are targeted for impacting the tank into the Pacific Ocean. OMS ΔV required for the launch phase for launches from VAFB is 350 fps for equivalent orbital conditions.

On-orbit translational ΔV is provided by the OMS and the reaction control subsystem (RCS). The OMS provides the propulsive thrust to perform orbit circularization, orbit transfer, rendezvous, and deorbit maneuvers. The RCS provides the propulsive thrust for three-axis angular control and three-axis translation of the Orbiter. The Orbiter will have the capability to use either the parking orbit technique or the direct ascent technique for rendezvous. In using the parking orbit technique, all orbit transfer maneuvers required to establish a terminal approach to the target will be executed using the OMS. In using the direct ascent technique, the Orbiter is launched into an intercept trajectory at the same inclination as the target. In using either technique, any trajectory corrections and braking maneuvers will be executed with the RCS.

PERFORMANCE CAPABILITIES

The performance capabilities of the Space Shuttle system are dependent upon the operational requirements established for each mission. The type of rendezvous technique, the payload pointing requirements, the operational constraints, the length of mission, the orbit transfer requirements, etc., determine the performance capability for any particular mission. The performance curves contained in this section represent the capabilities of the Space Shuttle system for typical sets of operational requirements. Certain items of equipment, consumables, etc., that are mission unique must be considered as part of the total payload, and in planning for a particular mission must be included as part of the payload weight. In addition, the OMS

and RCS are loaded to meet the specific on-orbit maneuver requirements and are not necessarily loaded to the total loading capacity.

The Orbiter integral OMS tankage has been sized to provide 1000 fps ΔV capability to the Orbiter with a 65 000-pound payload. Up to three extra OMS kits can be installed for increased operational flexibility. Each kit contains one-half as much usable propellant as the integral OMS tankage, resulting in a total propellant capacity two and one-half times that of the integral tankage.

PAYLOAD CHARGEABLE WEIGHT

The payload chargeable weight is the weight of additional personnel in excess of a crew of four, OMS kits, a docking module, additional consumables, and payload support equipment which are added to the basic Orbiter for a particular mission in excess of the basic Orbiter capability. Many of these items are available in the Space Shuttle hardware inventory, but must be listed separately in the Orbiter weight summary for the purpose of weight accounting.

LAUNCH AZIMUTHS AND INCLINATIONS

The operational azimuths from the two planned launch sites and the orbital inclinations obtainable are shown in Figure A-2.

CIRCULAR ORBITAL ALTITUDE PERFORMANCE

Figures A-3 and A-4 show payload delivery capability as a function of circular orbital altitude at various inclinations. Figure A-3 is for missions launched from KSC and Figure A-4 is for missions launched from VAFB. Separate plots are needed because of the different MECO conditions required for the two different launch sites.

Refer to JSC 07700, Volume XIV, Revision A, Space Shuttle Systems Payload Accommodations — Level II Program Definition and Requirements, for additional details concerning the Shuttle.

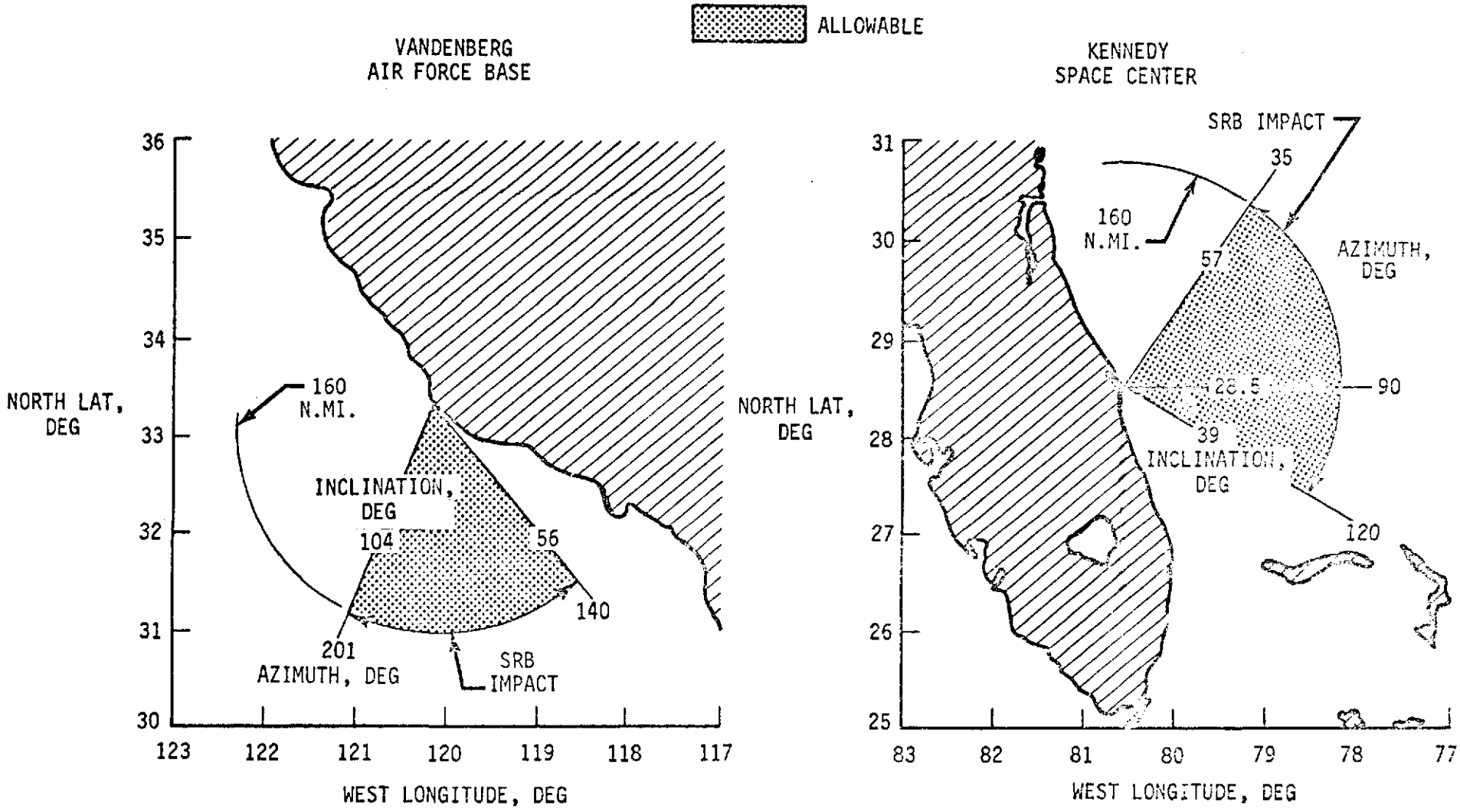

Figure A-2. Launch azimuth and inclination limits from VAFB and KSC.

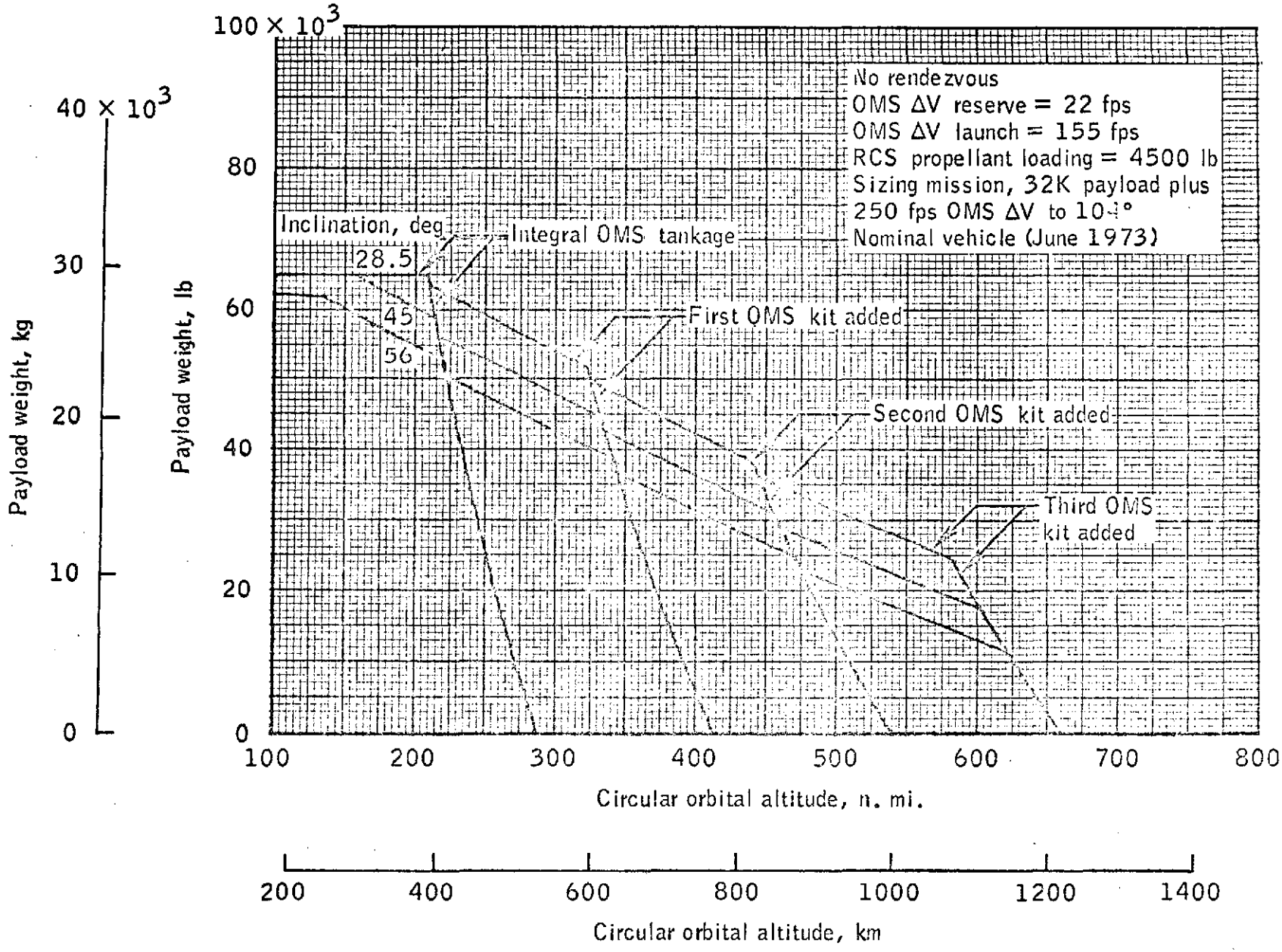

Figure A-3. Payload weight versus circular orbital altitude — KSC launch, delivery only.

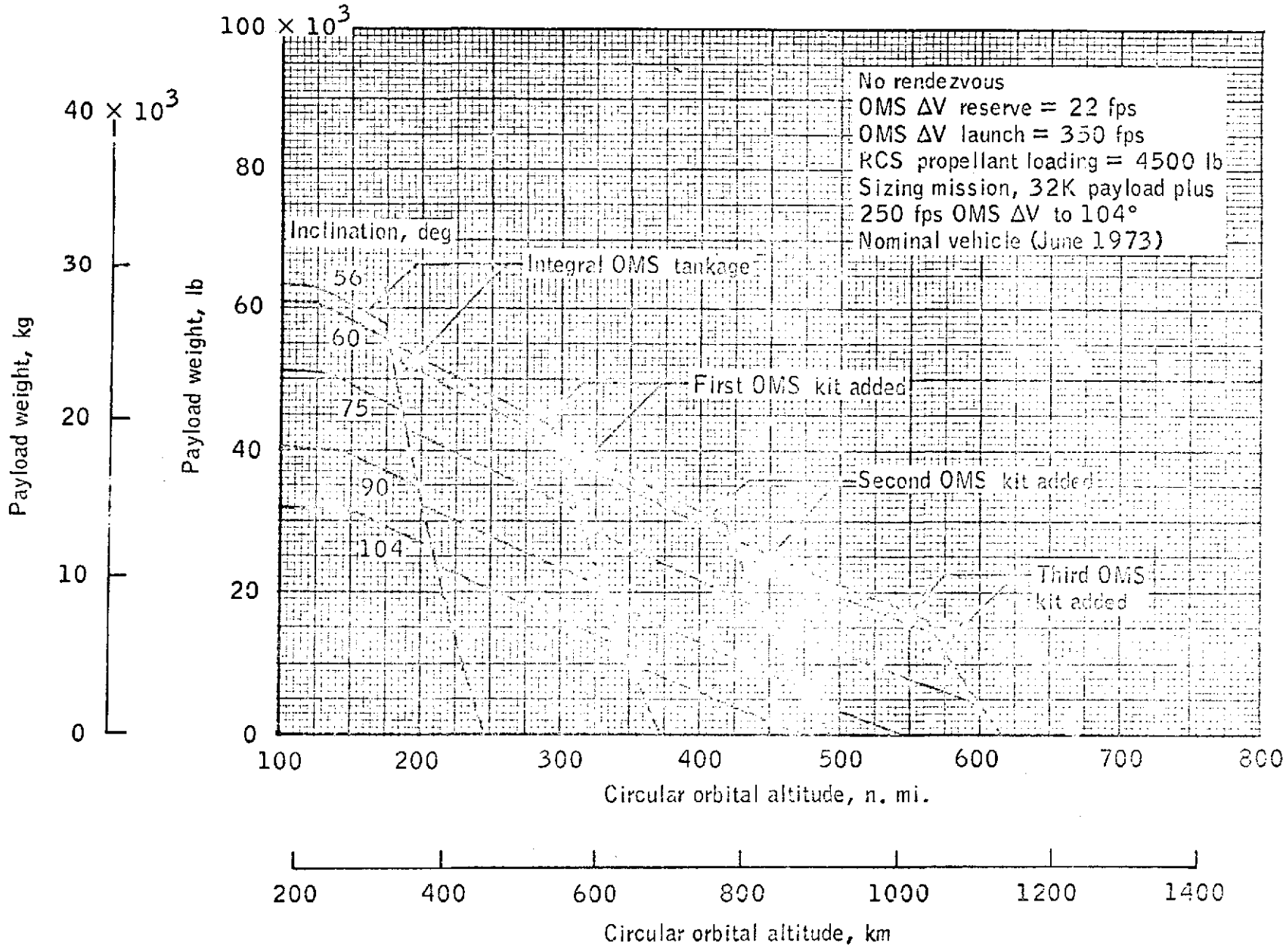

Figure A-4. Payload weight versus circular orbital altitude — VAFB launch, delivery only.

Space Tug System Description and General Capabilities

Both Tugs used in this analysis are Cryogenic Tugs. The Interim Tug with an assumed availability of late 1980 is designed using current technology. This Tug is capable of being reused but does not have payload retrieval capability. This Tug uses an RL10, Category I engine with a specific impulse of 444 sec.

The Interim Tug will be replaced in late 1983 with an upgraded Tug, which will have improved performance and payload retrieval capability. The RL10 will be replaced with an RL10, Category II engine with a specific impulse of 461 seconds. Rendezvous and docking avionics are added to allow the stage to retrieve payloads.

Table A-1 lists the characteristics of both the Interim and Full Performance Tugs. Figure A-5 is a typical configuration of the LOX/LH_2 Tugs. Both stages have the same dimensions. The performance numbers are based on the Tug leaving a 28.5-degree inclination, 160 n. mi. circular orbit and placing a payload in an equatorial synchronous orbit.

Kick Stage System Description and General Capabilities

A Growth Burner II with 9000 pounds of propellant was used as the kick stage in this analysis to reduce the number of Tugs that would have to be expended. Only one size kick stage, which was optimized for the planetary missions, was used throughout the Payload Model. Table A-2 lists the characteristics of the kick stage, and Figure A-6 is a typical solid motor kick stage configuration.

TABLE A-1. TUG CONFIGURATION DATA

	Interim	Full Performance
IOC Date	Dec. 1980	Dec. 1983
Type Propellant	LOX/LH_2	LOX/LH_2
Retrieval Capability	No	Yes
Length	34.8 feet	34.8 feet
Diameter	14.6 feet	14.6 feet
Dry Weight	5245 pounds	5257 pounds
Contingency	525 pounds	526 pounds
Residuals	864 pounds	864 pounds
Burnout Weight	6284 pounds	6297 pounds
Max. Main Prop.	55 700 pounds	55 700 pounds
Max. ACS Prop.	727 pounds	217 pounds
In-Flight Losses	961 pounds	518 pounds
Main Engine Thrust	15 000 pounds	15 000 pounds
Main Engine Isp	444 seconds	461.6 seconds
RCS Isp Steady State	231 seconds	231 seconds
RCS I_{sp} Pulsing	220 seconds	220 seconds
FPR (%ΔV)	2 percent	2 percent
Performance		
Deploy	5033 pounds	7091 pounds
Retrieve	NA	4250 pounds
Round Trip	NA	2750 pounds
Shuttle-Tug Adapter	2150 pounds	2150 pounds

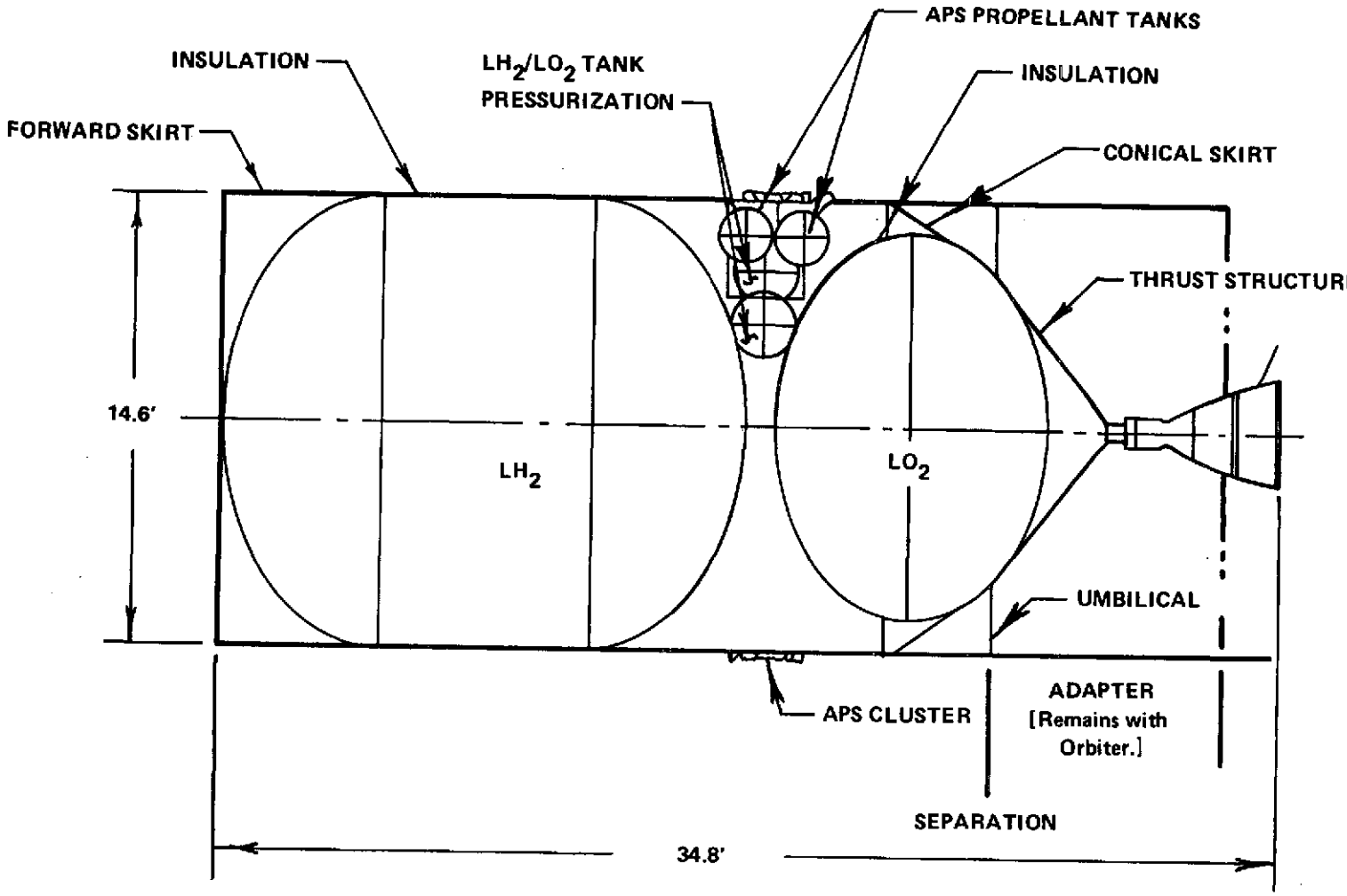

Figure A-5. Initial cryogenic Tug.

TABLE A-2. GROWTH BURNER II CHARACTERISTICS

Length	8.5 feet
Diameter	82 inches
Burnout Weight	1034 pounds
Main Propellant	9000 pounds
I_{sp}	284 seconds

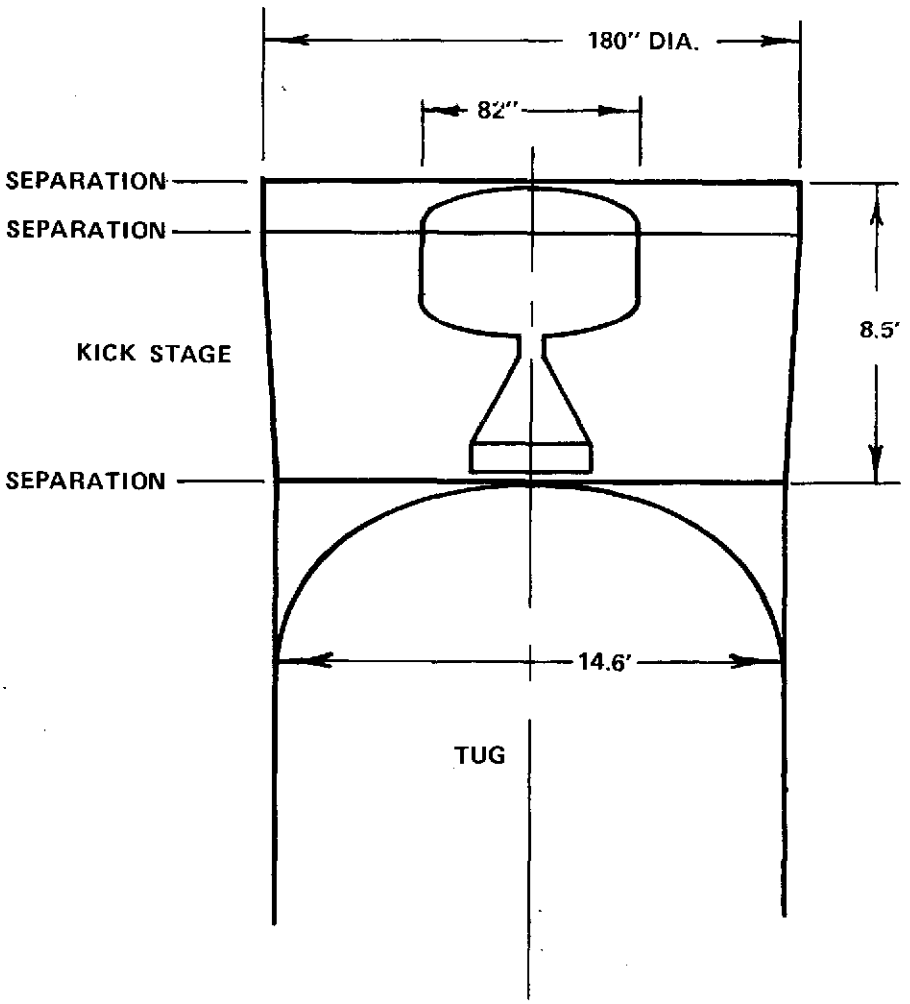

Figure A-6. Typical kick stage configuration.

APPROVAL

THE OCTOBER 1973 SPACE SHUTTLE TRAFFIC MODEL

By Shuttle Utilization Planning Office

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.

William A. Huff

WILLIAM A. HUFF
Manager, Shuttle Utilization Planning Office
Program Development

James T. Murphy

JAMES T. MURPHY
Director, Program Development

*U. S. Government Printing Office:-1974-748-294/109